

JANUARY • 1958
PRICE 40 CENTS

ELECTRICAL CONSTRUCTION AND MAINTENANCE

WITH ELECTRICAL CONTRACTING

page 85

OUTLOOK FOR '58—how the trends and
prospects for electrical construction activity
shape up for the new year.

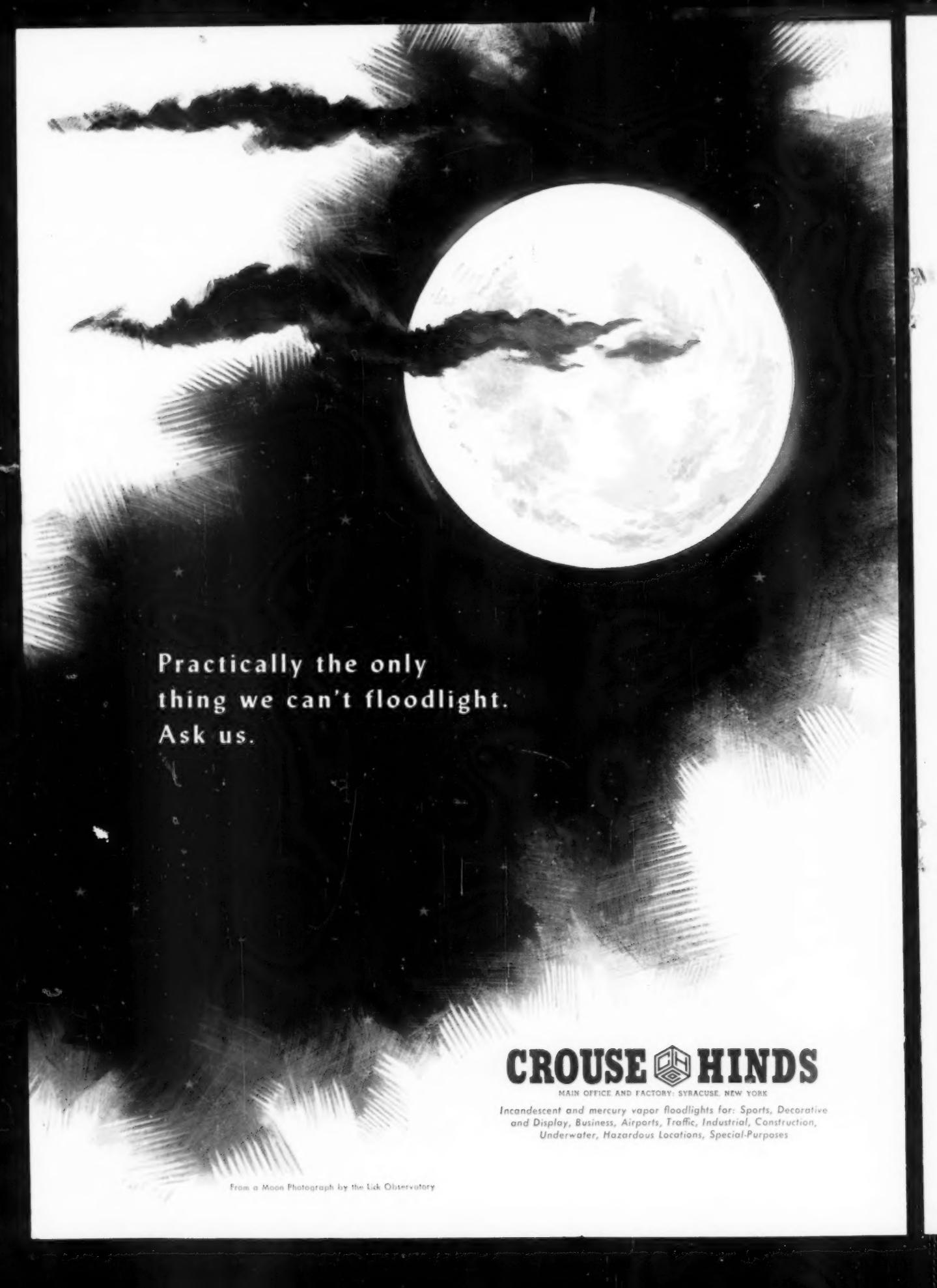


LIGHTING WINNERS—details of top prize-winning lighting installations from the International Lighting Competition.

page 88

page 106

MAINTENANCE CONTRACTS—how a king-sized Los Angeles electrical maintenance organization operates.



Practically the only
thing we can't floodlight.
Ask us.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

Incandescent and mercury vapor floodlights for: Sports, Decorative
and Display, Business, Airports, Traffic, Industrial, Construction,
Underwater, Hazardous Locations, Special-Purposes

From a Moon Photograph by the Lick Observatory

SAFETY SWITCHES STAND UP UNDER 100,000 AMPERE SHORT CIRCUIT TEST!

INDEPENDENT TESTING LAB RELEASES FINDINGS AFTER GRUELLING "TORTURE RACK" TESTS

Unprecedented tests have been completed on 30 through 600 ampere rated Square D safety switches equipped with high capacity current limiting fuses. During these tests, switches were closed on a short circuit system delivering up to 100,000 amperes (symmetrical—R.M.S.). In addition, the fault was applied on the closed switches. All switches *withstood the shocks without any sign of failure!*

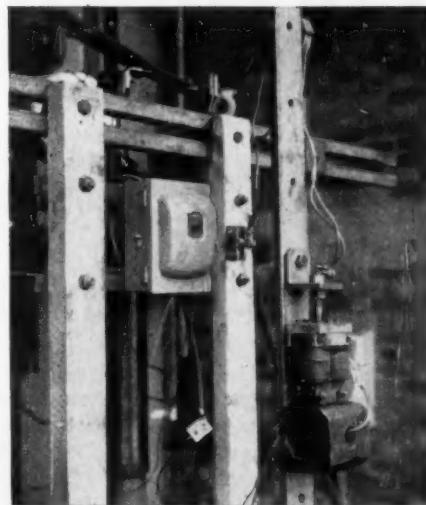
High Capacity Systems Demand Stamina

High capacity systems capable of delivering tremendous short circuits are becoming more and more prevalent with the growth of electrical loads. Network systems in metropolitan areas are a source of

such faults. Another, the heavy industrial areas, with a concentration of sub-stations and rotating machinery. Terrific stresses and heat generated by such faults are serious hazards to both personnel and equipment unless properly contained. That is why proven protection for switching service and feeder circuits is of major concern.

Square D Standard Switches Do The Job

These tests offer conclusive proof that standard Square D Type HD and Type ND switches, equipped with high capacity current limiting fuses, can be used on such systems without fear of failure. You pay no premium for the proven performance they offer. Why settle for less?



Square D switch on "torture rack" during test involving up to 100,000 ampere short circuit

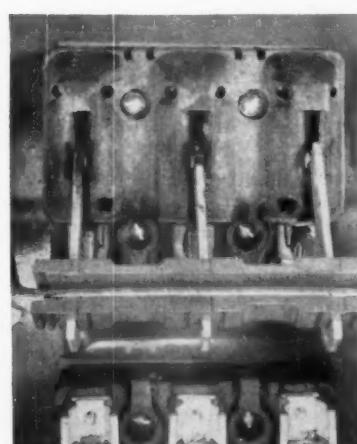
SUMMARY TABLE • Extract from Report No. S/NA R66—Sheet No. 5

Ampere Rating	Voltage Rating	Catalog Number	Average Symmetrical Prospective Current R.M.S.	Recovery Voltage R.M.S.	Maximum Total Arcing Time	Fuse Type
30	250	A85351	96,600	252	.0009	A2Y-30A
30	250	A85351	96,400	253	.0010	FRN-30A
30	600	A85341	107,000	590	.0020	A6Y-30A
30	600	A85341	106,000	601	.0027	FRS-30A
60	250	A86352	96,400	248	.0010	A2Y-60A
60	250	A86352	95,200	252	.0019	FRN-60A
60	600	A86342	106,000	605	.0011	A6Y-60A
60	600	A86342	108,000	598	.0020	FRS-60A
60	600	A86342	107,000	601	.0013	NAS-60A
100	250	A86353	95,200	253	.0009	A2Y-100A
100	600	A86343	106,000	604	.0014	A6Y-100A
200	250	A86354	95,200	253	.0037	A2Y-200A
200	600	A86344	107,000	602	.0011	A6Y-200A
400	250	A86355	95,900	252	.0039	A2Y-400A
400	600	A86345	106,000	611	.0050	A6Y-400A
600	250	A86356	94,500	251	.0062	A2Y-600A
600	600	A86346	107,000	601	.0062	A6Y-600A

Above • Extract of Nelson High Power Laboratory Report C/NA-66

At left • No sign of failure in this switch interior after 100,000 ampere short circuit test

**SQUARE D
SAFETY
SWITCHES
GIVE YOU
Certified
PERFORMANCE!**



EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY



APPLETON V-51 SERIES CONVERTIBLE VAPOURTIGHT FIXTURES

*Require only seconds
to relamp or convert!*

One trip up the ladder, a few quick twists of the wrist, and relamping or wattage conversion is done! V-51 reflectors with integral neoprene ring adapt perfectly to the grooved unilet... permit instantaneous substitution of reflectors.



Maintenance man takes spare assembly to lamp requiring replacement or wattage change... removes lamp assembly... screws fresh unit in place and the job is done! Higher wattages of 150/200 are interchangeable with 100 watt unit and can be used in same unilet body. (Die-cast aluminum guard turns counter clockwise to act as a tool for easy removal in relamping).

An upward thrust and slight quarter twist engages neoprene ring with the groove in the unilet and snaps the reflector in position. Entire operation of removing lamp, inserting new unilet, and positioning of reflector requires no special tools... no set screws... no small parts to juggle. Absolute simplicity!



Reflector
Steel, with green porcelain enamel exterior; sized for 100 W, 150 W, or 200 W lamps. Snaps easily into position.

Unit Assembly . . .
Adapter, Globe,
and Guard

100 W and 150-200 W size globe adapter with shock absorbing socket. Die cast aluminum guard has two sealed stainless steel ball plungers which snap securely into cavities in adapter. Vaportight globe in 100 W or 150-200 W sizes in clear glass or various colors.



U. S. Pat. 2,749,433
2,749,435 2,715,214
Canada Pat. 531,655
511,696

For economical service and maintenance, it's hard to find anything more practical than Appleton's V-51 Series exclusive unit assembly (adapter, receptacle, globe, and guard). Shock absorbing socket cuts lamp replacement costs. Try the Appleton V-51 Series standard or shallow dome, deep bowl, or angle type reflectors and 100 W and 150/200 W vaportight unit assemblies in your plant today. Available in a variety of hub sizes in pendent, ceiling, or bracket type fixtures for every kind of installation.

APPLETON ELECTRIC COMPANY
1704 Wellington Avenue • Chicago 13, Illinois

Also Manufacturers of:

"ST" Series Connectors



Explosion-
Proof
Fixtures

Malleable Iron
Unilets & Covers



Automatic
Reelites



Sold
Through Franchised
Wholesalers Only

Rely on
APPLETON
... the Standard for
Better Wiring®

ELECTRICAL CONSTRUCTION AND MAINTENANCE

with which is consolidated Electrical Contracting, The
Electrologist and Electrical Record . . . Established 1901

Published for electrical contractors, industrial electricians, engineers, consultants, inspectors and motor shops. Covering engineering, installation, repair, maintenance and management, in the field of electrical construction and maintenance.

57th Year JANUARY • 1958

Sidelights	5
Washington Report	7
Modernization for Missiles, <i>An Editorial</i>	83
Outlook for 1958	85
By W. T. STUART—Advancing standards and price increases are expected to push electrical work ahead of construction trends this year.	
Office Lighting	88
Low brightness troffers give high comfort in office lighting. One of the awards in the International Lighting Competition.	
Outdoor Lighting	90
Floodlighting accents beauty of monument and fountains. One of the awards in the International Lighting Competition.	
Institutional Lighting	92
Luminous ceiling lights modern library and enhances architectural design. One of the awards in the International Lighting Competition.	
Store Lighting	94
Recessed incandescents provide ideal light for supermarket. One of the awards in the International Lighting Competition.	
Residential Lighting	96
Fluorescents and incandescents provide flexible lighting for comfortable living. One of the awards in the International Lighting Competition.	
Industrial Lighting	97
800-ma lamps provide general lighting for inspection. One of the awards in the International Lighting Competition.	
Estimating Forum—VII	98
By RAY ASHLEY—Operating costs—factors affecting project overhead.	
Large Motor Rewinding	100
By W. J. MARTENS—Time sequence story of a Torrance Electric Motor Shop job in Rock Island, Ill.	



ELECTRICAL CONSTRUCTION and MAINTENANCE

JANUARY • 1958

continued

1700 Maintenance Contracts.....	106
By B. J. HARTMANN—Features of an active maintenance organization on the west coast.	
Drying Varnished Cable in Conduit.....	112
By H. D. JEFFERSON—Renewing a primary system by drying varnished cable in conduit.	
Mobile Aerial Tower	113
Elevated maintenance is facilitated by mobile aerial tower having 95-ft reach.	
Practical Methods	116
Electric trucks and conveyors speed warehousing; simple disconnecting means results in easy maintenance of high bay lighting units.	
Type AC Switch Application.....	128
By P. H. WINTER—Ratings, uses and applications of type ac general use snap switch.	
Reader Service	133
Product news announcements; catalogs and bulletins.	
Reader's Quiz	161
Questions and answers on transformer connections; how to dry flooded motors.	
Questions on the Code.....	168
Answers to code questions on sealing requirements; precast cellular concrete raceways; fixture supports.	
Motor Shops	179
Commutator undercutter attaches to lathe; warning tag for dual-voltage motors.	
In the News.....	187
Dates Ahead	196

Vol. 57, No. 1

ELECTRICAL CONSTRUCTION and MAINTENANCE

January 1958

Published monthly with an additional issue in September by McGraw-Hill Publishing Company, Inc. James H. McGraw (1860-1948), Founder, Executive Vice President and Chairman of the Board; Donald C. McGraw, President; Joseph A. Gerard, Executive Vice President; L. Keith Goodrich, Vice-President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice-President, Publications Division; Ralph B. Smith, Vice-President and Editorial Director; Joseph H. Allen, Vice-President and Director of Advertising Sales; A. R. Venezian, Vice-President and Circulation Coordinator.

Subscriptions are solicited only from persons engaged in electrical construction, maintenance or consulting services. Position and company connection must be given on application for subscription.

United States subscription rate for individuals in the field of the publication \$3.00 per year. This issue 40 cents. Electrical Products Guide \$2.50. Canada, \$5.00 a year. All other countries, \$15.00 a year, payable in advance. Entered as second class matter August 29, 1938 at the Post Office at Albany, N. Y., under act of Mar. 3, 1879. Printed in U. S. A. © Copyrighted 1958 by McGraw-Hill Publishing Co., Inc. — All Rights Reserved.

SUBSCRIPTIONS: Send subscription correspondence and change of address to Subscription Manager, Electrical Construction and Maintenance, 330 West 42nd Street, New York 36, N. Y. Subscribers should notify Subscription Manager promptly of any change of address, giving old as well as new address, and including postal zone number, if any. If possible, enclose an address label from a recent issue of the magazine. Please allow one month for change to become effective.

W. T. STUART, Editor
Alice McMullen, Managing Editor
Berlon C. Cooper, Eastern Editor
August Eckel, Middle West Editor
Hugh P. Scott, Industrial Editor
J. F. McPartland, Jr., Engineering Editor
W. J. Novak, Assistant Editor
W. J. Martens, Assistant Editor
L. E. Devendorf, Art Editor
Ray Ashley, B. A. McDonald, Glenn Rowell, B. Z. Segall, Consulting Editors
W. A. Cyr, Western Consultant
De ster Keezer, Dir. Economic Staff
George B. Bryant, Jr., Chief Correspondent, Washington Bureau
John Wilhelm, Editor, World News

W. W. GAREY, Publisher
A. L. DeWeerd, Circulation Manager
C. B. Shaw, Advertising Sales Manager
District Managers
A. B. Conklin, New York
E. P. Gardner, New York
A. E. French, Jr., Philadelphia
F. J. Seiler, Cleveland
R. A. Hubley, Detroit
Charles F. Minor, Jr., Chicago
R. R. Ream, Chicago
T. H. Carmody, R. C. Alcorn, San Francisco
George Miller, Dallas
R. H. Antles, Los Angeles
R. H. Powell, Atlanta

Member of
AUDIT BUREAU OF CIRCULATIONS and
ASSOCIATED BUSINESS PUBLICATIONS

Sidelights

GOOD OUTLOOK—In spite of the so-called economic "breather" of recent weeks, the outlook for electrical construction activity for 1958 is distinctly favorable. Dollar volume will move upward by about 10% on the basis of expected price increases and the currently rapid advancement in electrical systems requirements reflecting increased standards in lighting, air conditioning and industrial power. Our forecast begins on page 85.

One important hedge must be considered this year in evaluating the future market potential. The sputniks may have upset a lot of otherwise sound predictions. As our Outlook was written, there were no indications of just what effects will result, but we can be reasonably certain that whatever programs materialize, they will increase demands for the goods and services of this industry.

ELECTRICAL WEEK—Observance of the third National Electrical Week is scheduled for February 9 to 15. Most of the leagues, utilities and electrical trade associations will be telling the public about the great contributions the electrical industry has made and is making to all phases of American life. It is a good time to tell your story too and to identify your own company with the activities of the industry. See "National Electrical

Week" news story on page 187.

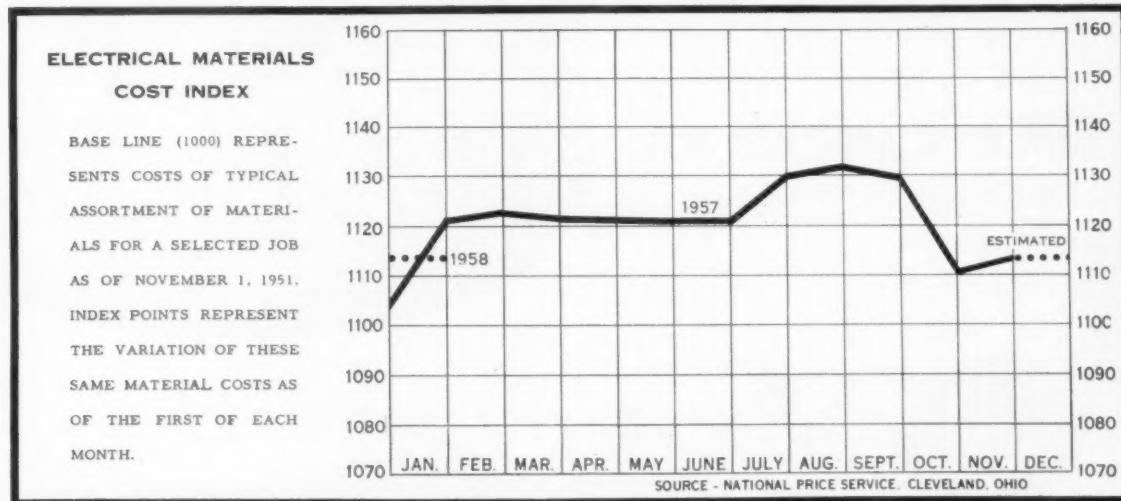
NEW TITLE—Her many friends in the industry will be glad to note that Alice McMullen, formerly Associate Editor of "Electrical Construction and Maintenance", was named Managing Editor on December 1. Miss McMullen joined McGraw-Hill in 1927 and the staff of "Electrical Contracting" as Assistant Editor under the late Earl Whitehorne in January 1937, and later became Associate Editor. In addition to her line responsibilities, she is Secretary of the Editorial Board of McGraw-Hill and Assistant Secretary of the James H. McGraw Award for Electrical Men. During her 20 years on this publication, she has made an outstanding contribution to the growth of the magazine.

PRIZE WINNERS—Each of the six lighting installations which won a first prize in the Electrical Contractor Division of the 1957 International Lighting Competition are presented this month, beginning on page 88. These top lighting jobs represent outstanding work done by electrical contractors, in industrial, store, office, institutional, outdoor and residential lighting. Other prize winning entries in the Architect/Engineer and Electrical Contractor Divisions of this contest will be published in future issues.

Watch for them. They will be identified by the special contest seal which identifies this month's prize winners.

MAINTENANCE METHODS—Two decades of experience in the lighting field lie behind Flood-Lite Service, a king-sized maintenance organization handling over 1700 contracts out of seven offices situated along a west-coast crescent sweeping to termini at Chicago and Houston. Their many methods of operation, promotional approaches, special equipment, use of direct radio and modern office equipment are topics which are frankly analyzed by Vice President Benn Hartmann, who begins his practical discussion on page 106.

AERIAL TOWER—One of many unique maintenance problems encountered at New York's International Airport is related to the cleaning, relamping and servicing of sky-scraping floodlights mounted outdoors atop 75-ft high towers and indoors above hi-bay roof trusses of hangars measuring several times the size of a football field. These conditions call for special equipment, such as a "Mobile Aerial Tower" having a 95-ft reach, stabilizing outriggers, both platform and ground controls and a host of safety features. Details of design and application can be found by turning to page 113.



Reach

For

Test

Proven

ACCURATE TAPES

FRICITION, RUBBER and PLASTIC

ACCURATE MANUFACTURING COMPANY Garfield, New Jersey



Washington Report

A mild decline in the 1958 economy is predicted by some economists, but most government officials are optimistic that 1958 will, for the year, hold to the current high levels. A rolling readjustment is admitted. Most forecasters think the first half of this year will show some economic weaknesses, but that strength in the last half will keep the economy at its high level for the year. Here are some of the rolling factors:

- New building construction, accounting for some 10% of the economy, is expected to increase by 5%, dollarwise. Residential construction will be a strong supporting factor, aid appliance and furniture sales.
- Military spending will increase \$1 to \$2 billion, as demand for missile development and production expands.
- Auto production and sales are expected to equal, or exceed last year's total.
- Business spending plans for new plants and equipment show a cutback of up to 10% from 1957, but will still be above any year previous to 1956.
- Industrial production, a prime gauge of business conditions, has slowed down. FRB Index for last November was 139% (of 1947-49 average), down from 146% a year earlier.
- Reduction in employment has been widespread, and unemployment is up. Unemployment in mid-November last year totaled 3,200,000, highest level for the month since 1949, while employment dipped to 64,900,000, lowest point since 1956.

Manufacturers' shipments of fluorescent lamp ballasts decreased in 3rd quarter of 1957, according to report by Census Bureau. Shipments totaled 6,126,000 units, valued at \$17,094,000, down 3% and 2% respectively from 2nd quarter figures.

Wages for civilian employees on Federal payroll have nearly doubled in ten years. In 1947 Executive Branch employees numbered 2,116,000, were paid \$5,807 million annually; last year an estimated 2,410,000 employees (up 14.6%) were paid an estimated \$11,066 million (up 91%).

An Office of Construction Statistics has been established in the Business and Defense Services Administration, Dept. of Commerce, and assigned the responsibility of acting as focal point in Dept. of Commerce for planning, developing, and conducting fact finding activities on major aspects of the construction industry, such as volume costs, materials production and consumption. Walter W. Schneider, formerly chief of Construction Statistics and Economics Branch, BDSA, has been named Director of the new office.

New construction expenditures last November hit a new high for the month, of \$4.1 billion, up 4% over the same 1956 month, Commerce and Labor Depts. reported. They also predicted a 1957 record of over \$47 billion, up \$1 billion from 1956, or 2%. This will be the 12th year of new construction records, and an increase of 5% over 1957 has been predicted for this year.

Capital spending for new plant and equipment during this quarter will drop about 5% from last quarter, to annual rate of \$35.5 billion, according to recent joint estimate of Dept. of Commerce and Securities Exchange Commission. Total spending last year topped \$37 billion, or 6% over 1956, it was reported.

Residential construction is showing signs of an upturn, as monthly housing starts begin to exceed the total for the year-earlier period. In November 78,000 starts were made, or an annual rate of 1,010,000.



ONONDAGA COUNTY
OFFICE BLDG.

ARCHITECTS
KING & KING

ELECTRICAL
CONTRACTOR
BEC ELECTRIC CO.

FOR DEPENDABILITY BEYOND A DOUBT

ALWAYS SPECIFY 

In the modern new Onondaga County Office Building in Syracuse, New York — as in more and more buildings across the country — planners used the complete line of Pass & Seymour wiring devices for super-tested, thoroughly proved trouble-free performance.

The famous precision-engineered P&S 20-AC1 Switch was among the devices chosen. It operates quietly, yet electrical contact is firm and positive. Can be used at full-rated capacity on fluorescent and tungsten filament lamp loads. Features positive kickoff, back or side wiring terminals, oversize long-life silver alloy contacts. The P&S 1530 Duplex Outlet was picked for its long heavy-duty life. Rated at 15

Amperes, 125 Volts, it features precision-formed double grip contacts, T-slots and washer ears. Strap is enclosed and completely insulated for extra protection.

Intensive research, expert engineering and more than 67 years of specialized experience are behind every Pass & Seymour device. Their long-life, low maintenance reliability will add to your reputation.

For information on any of the long line of dependable P&S devices, write Dept. AR-24.



20AC-1



1530 OUTLET



PASS & SEYMOUR, INC.

SYRACUSE 9, NEW YORK

60 E. 42nd St., New York 17, N.Y. 1440 N. Pulaski Rd., Chicago 51, Ill.
In Canada: Renfrew Electric Limited, Renfrew, Ontario

MAKE THE COMPLETE JOB COMPLETELY P&S

Pay Of College Teachers... Where The Russians Are The Capitalists

This editorial deals with a simple question about college faculty salaries: Which country pays its teachers better, Russia or the United States? It's a good question, with a sadly embarrassing answer.

That American college and university teachers are underpaid is not a novel observation. But what has happened to the economic status of their profession can be put in more candid terms. **As far as financial incentives are concerned, we have virtually socialized the academic profession.** Teaching has become such a poorly paid career, with so little prospect of material reward for outstanding performance, that it simply does not attract enough highly qualified young men and women.

Ironically, the Soviet Union has deliberately and successfully used capitalist incentives to improve its educational system. Although the Russians show an utter disregard of civil liberties, they pay their teachers well and confer on them all the prestige and privileges the Soviet society can offer. Russian professors, together with party officials and scientists, have become the privileged upper class of a supposedly classless society.

Incentives To Be A Teacher

To be a college teacher requires high intellectual competence and long, sometimes costly, formal training. Aside from the appeal of academic life, what incentive does college teaching offer bright young men and women?

In the U. S., the average faculty salary is little more than the average income of industrial workers. According to the National Education Association, the average faculty salary is about \$5,240. College instructors receive \$4,100, associate professors \$5,730 and full professors \$7,100.

The average income of U. S. factory workers in 1956 was \$4,580.

Actually, workers in many industries — steel, automobile and petroleum, for example—earn more on the average than college teachers. And skilled workers often earn more than full professors at some of our colleges and universities.

In Russia, on the other hand, the young Soviet graduate can see that it pays — and pays very well — to choose teaching as a career. The head of a department in a Russian university can command a salary of about 6,000 rubles a month.* This is about eight times the income of the average Russian worker, who earns 750 rubles a month.

The Russian professor comes off very well in terms of what his income will buy. It has been estimated that, based on Soviet consumption patterns, 6,000 rubles a month is worth about \$7,200 a year — or higher than the average professor's salary in the U. S. Of course, it is difficult to compare living standards in two countries as different as the U. S. and Russia. But particularly in the field of science — where the salaries can run to 15,000 or more rubles a month — it is clear that the Soviet professor enjoys a higher real income than that offered his American counterpart by a much more prosperous economy.

Incentives To Be A GOOD Teacher

Russia also offers much higher premiums than the U. S. to those who attain distinction in teaching. Teachers at the university level earn significantly more than teachers in high schools, and university instructors can look forward to a sharply progressive rise in earning power as they

* *Soviet Education for Science and Technology* by Alexander Korol of the M.I.T. Center for International Studies.

**How Faculty Salaries Compare
With Industrial Wages**
(Worker's Wage In Each Country = 100)



*Sources: Center for International Studies, M.I.T.; National Education Association; McGraw-Hill Department of Economics

advance to higher positions. The spread between the income of a full professor and the lowest academic position is greater than fifteen to one. In addition, full professors can earn a healthy bonus if they are elected to membership in the Russian Academy of Sciences.

In the U. S., by contrast, full professors on the average earn less than twice as much as beginning instructors. And many college professors earn less than public school teachers in large cities. Even a full professor's pay does not compare with earnings in other professions or in positions in industry requiring similar training. The point was well summarized in a recent speech by Marion B. Folsom, Secretary of Health, Education and Welfare: "It is nothing short of a national disgrace that we are discouraging people who want to teach by offering salaries that are far below the levels justified by their training and far below the levels which others are willing to pay."

Our colleges and universities, as well as our teachers, find themselves in a serious predicament. Faced with a shortage of both funds and teachers, they cannot reward distinguished performances. Limited resources for salary increases have gone predominantly to the lower ranks, so that an adequate number of teachers could be retained. Meanwhile, potentially fine teachers are being siphoned off into better paid occupations.

The shabby treatment of our teachers threatens to undermine, not only our educational

standards, but our free enterprise system itself. There is the recent example of a liberal arts college which discovered that five of its graduating seniors were being offered starting salaries higher than those paid any of their professors. It would be surprising if experiences like this did not place a strain on the enthusiasm with which these professors deal with some key aspects of American capitalism.

Also important is the role education is playing in the cold war with the Soviet Union. The Russians have made great strides in raising the quality of their education — particularly in science and engineering. Both the number and the technical calibre of their graduates are impressive, as recent Soviet achievements testify. These successes owe much to the generous economic treatment the Russians have given their teaching profession.

A Standard For Faculty Pay

Earlier editorials in this series have outlined various ways American business can help relieve the financial plight of our colleges and universities. They have suggested that private contributions to higher education should average at least \$400 million a year over the next ten years if faculty salaries are to be raised to adequate levels and our colleges are to be able to meet increasing operating costs.

Another standard for raising faculty salaries proposed by an American businessman is this: "When a teacher's income gets up to a point where you will suggest to your boy that he ought to give some thought to teaching as a profession, then we may be approaching the right figure."

Russia clearly has set her teaching salaries well above the "right" figure. We are nowhere near it. What this adds up to is that the Communists — not we — have become the shrewd capitalists in the vital field of education.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald O'McGraw
PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

HYVOLT SHIELDED POWER CABLE



GIVES
MORE AMPERES
PER DOLLAR
OF INSTALLED COST

LOOK AT THESE ADVANTAGES

1. Long life
2. Can be operated at 85° C. Permits smaller conductors or more amperes per conductor.
3. Freedom from corona cutting
4. Excellent resistance to moisture
5. Low power factor and dielectric loss
6. Lighter, more flexible, easier to handle and install than lead covered cables
7. Electrolytic or chemical corrosion of lead sheath is eliminated by use of neoprene sheath
8. Shielding prevents possibility of surface burning and provides safety to human life

CRESCENT HYVOLT insulation is made from butyl rubber which is inherently resistant to ozone, heat, moisture and aging. HYVOLT is formulated and processed so as to retain these inherent characteristics of the butyl rubber and at the same time provide excellent electrical and physical properties.

The insulation is protected during and after installation by an outer neoprene sheath providing a maximum degree of toughness, durability and long life. It is flame retarding and resistant to the deteriorating effects of moisture, sunlight, ozone (corona), oil, grease, and many acids and alkalies.

HYVOLT SHIELDING provides additional internal and external protection in these THREE WAYS:

1. Conductor shielding, as provided by a semi-conducting tape over the stranded conductors, excludes air pockets between conductor and insulation and eliminates possible internal corona-cutting of the insulation.
2. The semi-conducting tape between the insulation and

metallic shielding tape prevents possible ionization of air spaces and corona at the insulation surface.

3. The metallic shielding tape is grounded when installed, resulting in zero potential to ground at the sheath. It prevents surface discharge or burning, and protects cable from lightning surges. Reduces shock hazard.

RECOMMENDATIONS

CRESCENT SHIELDED HYVOLT CABLE is recommended for use in conduits, underground ducts, in wet or dry locations, or buried directly in the ground, for circuits operated at over 3000 volts and in accordance with I.P.C.E.A. recommendations. Available in single conductor or multi-conductor cables.

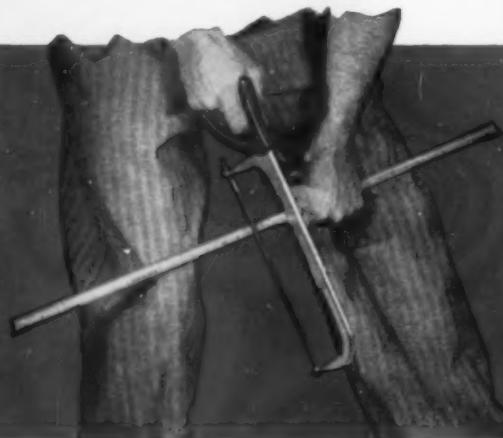
Specify CRESCENT SHIELDED HYVOLT POWER CABLE for general power circuits and where severe conditions are prevalent such as chemical plants, refineries, paper mills, mines, sewage disposal plants, etc. It is approved as Airport Lighting Cable Type B, CAA Specification L-824.

CRESCENT INSULATED WIRE & CABLE CO

TRENTON 5, N. J.

EXCLUSIVE "INCH-MARK" makes quick measurement a cinch. Every length of Republic ELECTRUNITE® E.M.T. is like a 10-foot rule—marked off from end to end in *feet* and *inches*. You avoid the clumsy problem of a flat rule on a round tube . . . eliminate guesswork.

"GUIDE-LINE" extends full length of tubing. By properly aligning with calibrations on Republic bender, bends are kept in the correct plane, thus avoiding costly "wows". Both "Inch-Marked" and "Guide-Lined" features come in $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1" and $1\frac{1}{4}$ " sizes.



THE BEST COSTS



GALVANIZING protects every inch of Republic ELECTRUNITE E.M.T. The special galvanized finish will not chip or flake when tube is bent. And because ELECTRUNITE E.M.T. is threadless, there's no unprotected steel exposed at the joint, no wrench marks to damage the finish.



UNIFORM CONCENTRICITY provides a truly round tube for snug-fitting connections that completely shut out moisture and concrete—protect against fire. Easy-to-use fittings that make sturdy rain-and concrete-tight joints are available in a complete range of types and sizes.

REPUBLIC



World's Widest Range of Standard Steels

EXCLUSIVE "INSIDE-KNURLING" reduces friction, thanks to inside ball-bearing surface—makes wire pulling as much as 30% easier. ELECTRUNITE E.M.T. is made to Underwriters' Laboratories Standards—is approved by the National Electrical Code for concealed, open and concrete construction—meets A.S.A. Specification C80.3 and Federal Specification WW-T-806.

UNIFORM DUCTILITY in every foot of Republic ELECTRUNITE E.M.T. assures smooth, accurate bends *every time*—with no costly kinks. Welded by the famous Electrunite Process, this quality conduit is 100% Republic—from ore to finished product. And rigid manufacturing-controls assure *complete uniformity*.



LESS INSTALLED



INSTALLATION ADVANTAGES OF E.M.T. make it your most practical raceway. To make tight joints, you simply tighten the fitting, not the entire run—a real aid where space is limited. Furthermore, it's lightweight, easy to handle. A bundle of $\frac{1}{2}$ " size—100 feet—weighs only 32 pounds.

COMPLETE INFORMATION on Republic ELECTRUNITE E.M.T., Rigid Steel Conduit and Dekoron®-Coated E.M.T. and Conduit for severe corrosive atmospheres is available upon request. Simply check desired material in coupon below. And remember . . . you'll be ahead when you specify Republic ELECTRUNITE E.M.T. on your next job, because—the *best costs less installed*.

STEEL
and Steel Products

**REPUBLIC STEEL CORPORATION
STEEL AND TUBES L. VISION
212 EAST 131ST STREET • CLEVELAND 8, OHIO**
Gentlemen: Please send me additional information on:
 ELECTRUNITE E.M.T. and Rigid Steel Conduit
 Dekoron-Coated E.M.T. and Dekoron-Coated Rigid Steel Conduit

Name _____ Title _____
 Company _____
 Address _____
 City _____ Zone _____ State _____
 C-3011BR



Mr. Scholz (left) at the site of one of his nationally distributed "Mark 58" prefabricated homes with Ken Sprengel of the Telephone Company

"Concealed telephone wiring adds sales appeal to our homes"

—says Mr. Don Scholz, of Scholz Homes Incorporated, Toledo, Ohio

"I compare selling new homes with selling new cars," says Mr. Scholz. "New homes have to be more attractive and more modern than what the public has had before, or they won't sell."

"Concealed telephone wiring is a feature that helps give prefabricated homes such as we manufacture the added sales appeal that attracts buyers. We merchandise it with the many other modern conveniences we offer. It's a valuable sales aid, and we take full advantage of it as such."

Mr. Scholz began manufacturing prefabricated homes in 1953, and last year sold 1500 units at an average completed sales price of \$30,000 each.

This year Mr. Scholz's "Mark 58" home will be nationally advertised and distributed. In today's competitive market, Mr. Scholz, like many other trend-minded builders across the country, recognizes concealed telephone wiring as an indispensable modern sales feature.

* * *

Your nearest Bell Telephone business office will help you with concealed wiring plans. For details on home telephone wiring, see Sweet's Light Construction File, 8i/Be. For commercial installations, Sweet's Architectural File, 32a/Be.

Working together to bring people together . . . **BELL TELEPHONE SYSTEM**



4

REASONS
WHY

Red DOT

MEANS VALUE PLUS

RED • DOT CONDUIT BODIES BY MASON
OFFER YOU THESE ADVANTAGES:

1. PLUS STRENGTH!

RED • DOT Conduit Bodies are non-corrosive aluminum die-castings, engineered for strength and to stand up under the most difficult conditions.

2. PLUS PRECISION!

Machined to exacting standards, they are easier to assemble.

3. PLUS FINISH!

They have the mirror-like finish of aluminum die castings both inside and out.

4. PLUS DESIGN!

They have been designed with twin objectives . . . maximum strength — maximum eye-appeal.

Send for New illustrated Catalog
of complete RED • DOT Line.

Sold only through Authorized
Electrical Distributors

Series "A"

Available in
the following series:

Series "A" Conduit Bodies

Threaded for heavy wall
rigid conduit.

Series "B" Conduit Bodies

Set-Screw for thin wall
conduit (EMT) electrical
metallic tubing.

Series "C" Conduit Bodies

Threadless for thin wall
conduit (EMT) electrical
metallic tubing.

All Series take standard covers.
RED • DOT cast aluminum
covers are available for all styles.

L.E. Mason Co. BOSTON 36, MASSACHUSETTS

Series "C"





Shown is LUXTROL light control type D2000

JUST DIAL THE RIGHT AMOUNT OF LIGHT FOR:



LUNCH, COCKTAILS, DINNER



THE TYPE OF MEETING



THE TIME OF DAY

"Sure, My Contractor Made \$500 Extra But — light control makes profits for me!"

That's the word you'll get from the customers you switch from old-fashioned "on-off" lighting to modern all-level lighting. Sure, it's a bigger investment, but your customers are more than satisfied because it helps *them* make more money, too.

All-level light control lets your customers select just the right level at the right time. *Bright* — to make customers hurry and make way for others. *Dim* — to make customers linger and spend more money. And in between an infinite variety of light levels for 101 different uses.

LUXTROL is a requirement today wherever people gather: in restaurants, night clubs, conference rooms, lobbies, schools, churches, funeral homes and many others.

Whenever you bid on a new job, or renovation, be sure to explain and *sell* the idea of all-level light control to your client. You'll both make more money out of it — and that's the perfect business deal! Send coupon for more facts.

LUXTROL Light Control Equipment



New Interlocking Types
When only a few circuits require control. Capacities from 1000 to 30,000 watts.



Packaged Types
6000 to 15,000 watt ratings. Circuits can be interlocked. Professional light control at budget prices.



Interlocking Types
Single units in 2500 and 6000 watt ratings for mounting in switchboard assemblies.



Type WBD 360
Magnis
Amplifier Systems
No moving parts or electronic tubes. Available in 3000, 6000 and 15,000 watt ratings.

a precision product of
THE SUPERIOR ELECTRIC COMPANY

501 ROGER ROAD, BRISTOL, CONNECTICUT

Name _____
Company _____
Street _____
City _____ Zone _____ State _____

Fresher...by far!



CHASE TAPES

Like to hook better taping results with one complete line? More and more contractors are with Chase Friction, Rubber, Plastic and Neoprene Tapes. Good reasons for it, too. Chase Saran-Wrapped Tapes eliminate ordinary storage problems . . . assure top taping qualities in every roll you use . . . keep contractors coming back for more. See for yourself! Order a factory-fresh supply today from your electrical supply wholesaler.

Chase & Sons, Inc., 26 Spruce Street, North Quincy, Mass.

CHASE & SONS INC.

North Quincy, Massachusetts

CABLE INSULATING TAPE • CABLE BINDING TAPE
CABLE JACKET TAPE • NEOPRENE SPLICING TAPE
FRICTION, RUBBER AND PLASTIC TAPE
LAMINATED AND REINFORCED INSULATION

NOW



GREAT
NAMES
COMBINE

*to bring you
the world's most
complete line*

ATTIC FANS

in sizes from 24" to 42" provide
complete home cooling at low cost.



RECESSED ELECTRIC BATHROOM CEILING HEATERS

"Instant heat" infra-red heaters and Exhaust
fan-light-heater-air circulator combinations.



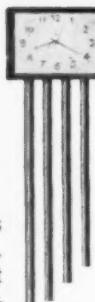
EXHAUST BLOWERS

"Squirrel cage" type dual and
single blowers for residential
exhaust ventilation.



AIR CIRCULATING FANS

32" and 52" ceiling mounted air circulating
fans can be quickly and easily installed to
keep porches, breezeways and patios cool,
comfortable and
insect free.



RITTENHOUSE CHIMES

Emerson-Pryne is national sales
representative for Rittenhouse . . .
manufacturers of America's most
distinctive line of door chimes, sig-
nalling systems and transformers.

EMERSON

PRYNE
COMPANY

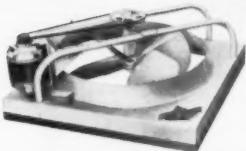
POMONA, CALIF. • KEYSER, W. VA.
ST. LOUIS, MO. • TORONTO, CANADA

A DIVISION OF THE EMERSON ELECTRIC MFG. CO., ST. LOUIS, MO.

EMERSON

pryne

Exhaust ventilating fans and blowers, kitchen ventilating fan-light-hoods, attic fans, air circulating fans, recessed lighting fixtures, electric bathroom heaters for safe ceiling installation.



EXHAUST VENTILATING FANS

Emerson-Pryne exhaust ventilating fans are made in a wide range of sizes and types for both ceiling and wall installation,

including the famous "thin-wall" Blo-Fans, straight-thru Axial Flo-Fans, and builders' special Aerofans.



RECESSED LIGHTING FIXTURES

Emerson-Pryne "Pry-Lite" recessed lighting fixtures, architect styled and contractor approved, are made in sizes, shapes and types for every illuminating application.



EASY-TO-CLEAN TILTING HOODS, made in 2 models with choice of length and finish, are exclusive with Emerson-Pryne.

KITCHEN VENTILATING HOODS



BEL-AIRE Stationary hoods, also in 2 models with choice of length and finish, assure true beauty and efficiency at project prices.



Thoroughbred
performance
on every job!

Bull Dog Tape

There's a
BULL DOG TAPE
for every purpose

- FRICTION
- RUBBER
- PLASTIC



BULL DOG TAPE goes on fast . . . sticks tight and stays tight. Splices neatly . . . extra strong and non-raveling. High dielectric strength for complete all-round electrical protection. BULL DOG resists weather and moisture . . . stands up longer on the job. Make BULL DOG your pet tape!

Sold only
through verified
wholesalers

Another quality product of

BOSTON

WOVEN HOSE & RUBBER COMPANY
DIV. OF AMERICAN BILTRITE RUBBER CO., INC.
BOSTON 3, MASS.

Also manufacturers of Garden Hose • Nozzles • Matting • Stair Treads

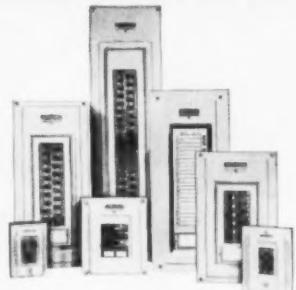
The Cutler-Hammer Unit Breaker is the quality safety center which can grow with future needs



Most new homes being built today are *expected* to grow electrically. New circuits will be required for added rooms, for air conditioning units, for automatic washers, clothes dryers, food freezers, power tools, etc. Such additions can require expensive rewiring and costly load center replacements unless sensible provision has been made for this growth with a low-cost, high-quality Cutler-Hammer Unit Breaker.

Far-seeing architects, contractors and home builders are installing Cutler-Hammer Unit Breakers with breaker panels big enough for future needs but with only the breaker units needed today. They do this with confidence because they know Cutler-Hammer Unit Breakers are quality-built for years of service. No product line as adequate and as successful in service as Cutler-Hammer Unit Breakers will ever become obsolete in the protection it provides.

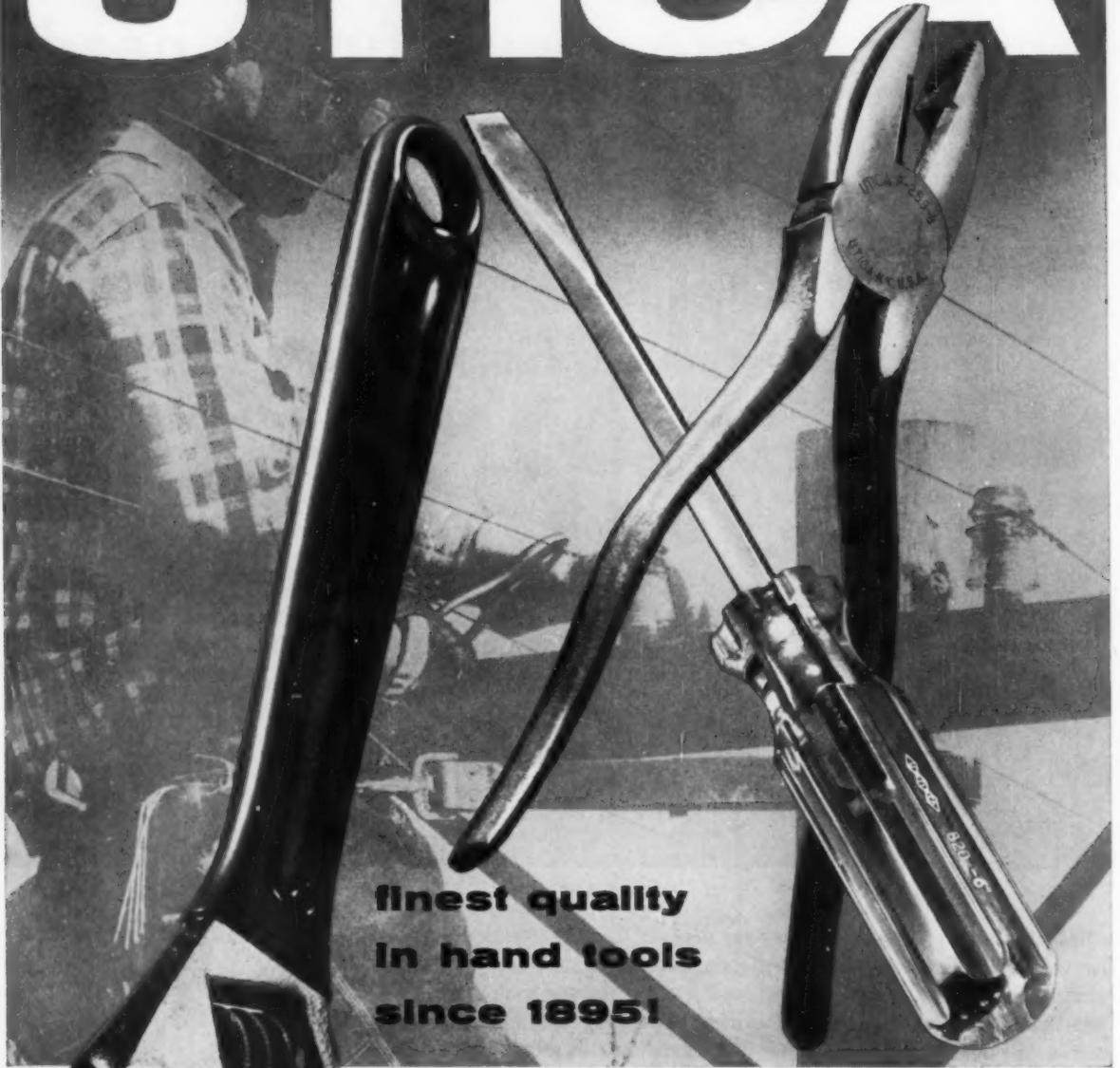
On your next job install a Cutler-Hammer Unit Breaker safety center. It is the finest and most dependable circuit protection available. Your nearby Authorized Cutler-Hammer Distributor is stocked and ready to serve you. Be sure to ask him for your copy of the Cutler-Hammer Unit Breaker Handi-Log, the complete safety center selector guide. CUTLER-HAMMER Inc., 1306 St. Paul Avenue, Milwaukee 1, Wis.



There is a Cutler-Hammer Unit Breaker for every homeowner's electrical future. Available in graduated sizes up to 32 single pole breakers with a 200 ampere bus or 8 double pole breakers and 10 single pole breakers on a 200 ampere split bus.



UTICA



**finest quality
in hand tools
since 1895!**

fully guaranteed

USE UTICA and do the job with industry's finest quality hand tools . . . the tools preferred throughout the telephone and electrical construction fields. Pliers and wrenches drop-forged for rugged durability! Induction hardened at points of greatest wear —for extra strength! And like all Utica hand tools, they are fully guaranteed. **Utica Drop Forge & Tool Division,
Kelsey-Hayes Co., Utica 4, New York.**

USE UTICA  *the tools the experts use!*

Hallmark of Quality since 1895

ADDS AN EXTRA
PAIR OF HANDS

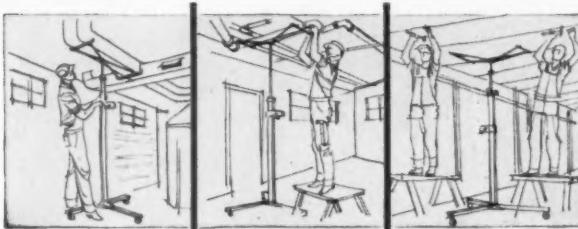
NOW One Man does the work of TWO on many High Jobs

•Lifts to a Full 13 Feet

•Cuts Cost... Saves Time In Overhead Electrical,
Plumbing and Heating Installations

For those jobs where it takes one man to "hold" and one man "to do", this amazing new Lantz Hi-Hoist will cut your labor costs in half!

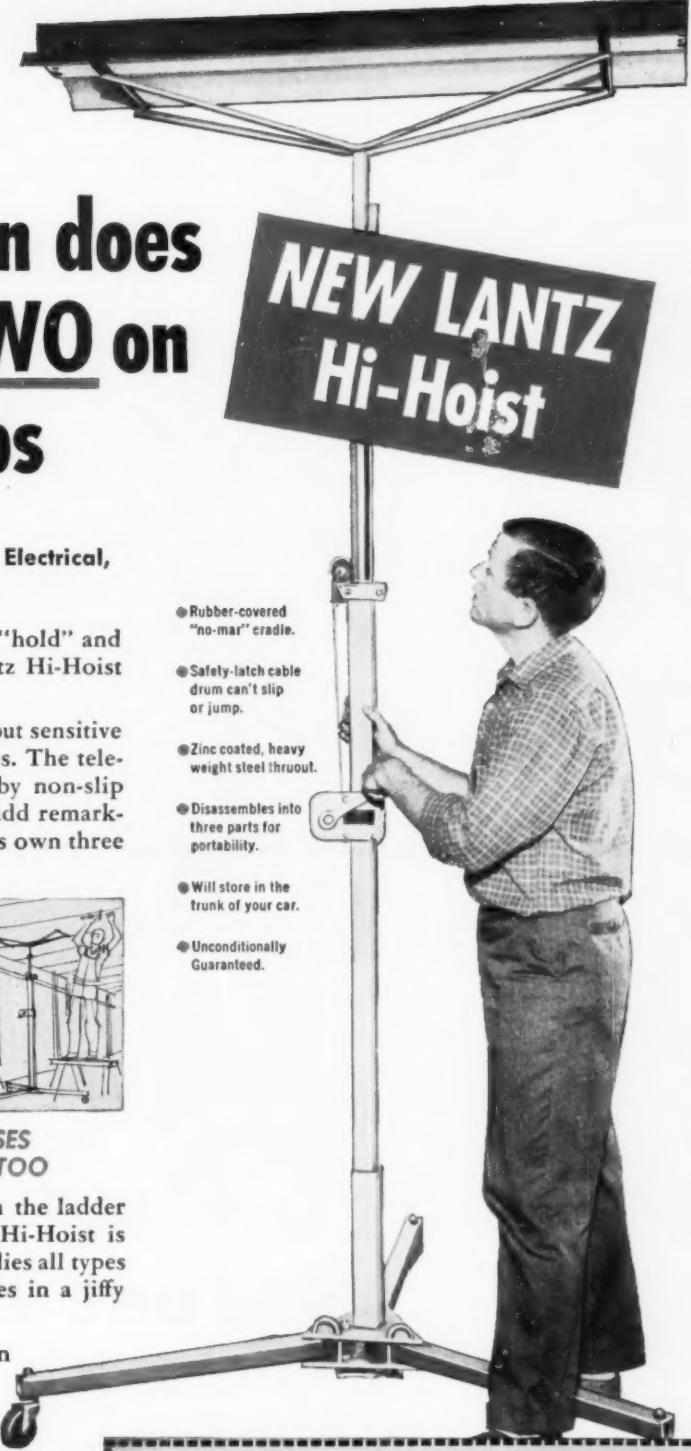
And it's sturdily built for 100-pound lifts but sensitive enough for your most delicate installations. The telescoping hoist mechanism is controlled by non-slip cable drum operation. Wide-spread legs add remarkable stability. And the Hi-Hoist rolls on its own three inch casters.



DOZENS AND DOZENS OF USES
AND COMPLETELY PORTABLE, TOO

Think of the many jobs where the man on the ladder needs two pairs of hands, and the Lantz Hi-Hoist is the answer. It hoists... it holds... it steadies all types of overhead installations and disassembles in a jiffy for transportation from job to job.

Mail the coupon today for full information on how the new Lantz Hi-Hoists can cut costs in your business.



Lantz Manufacturing Co., Inc.
Dept. 117-B, Valparaiso, Indiana

Please send full information on your new Lantz HI-HOIST and 10-day trial offer.

Name.....

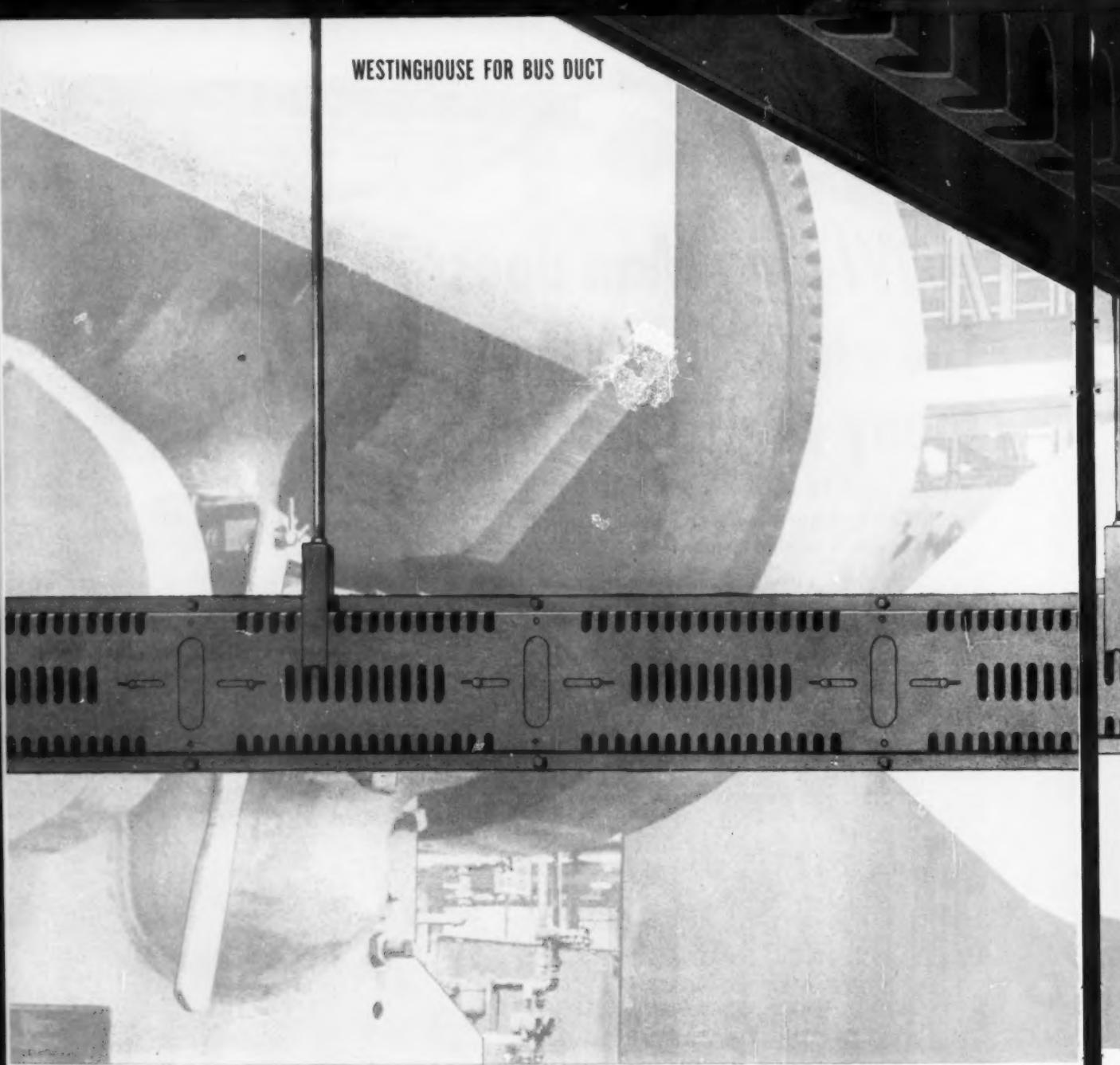
Business.....

Address.....

LANTZ

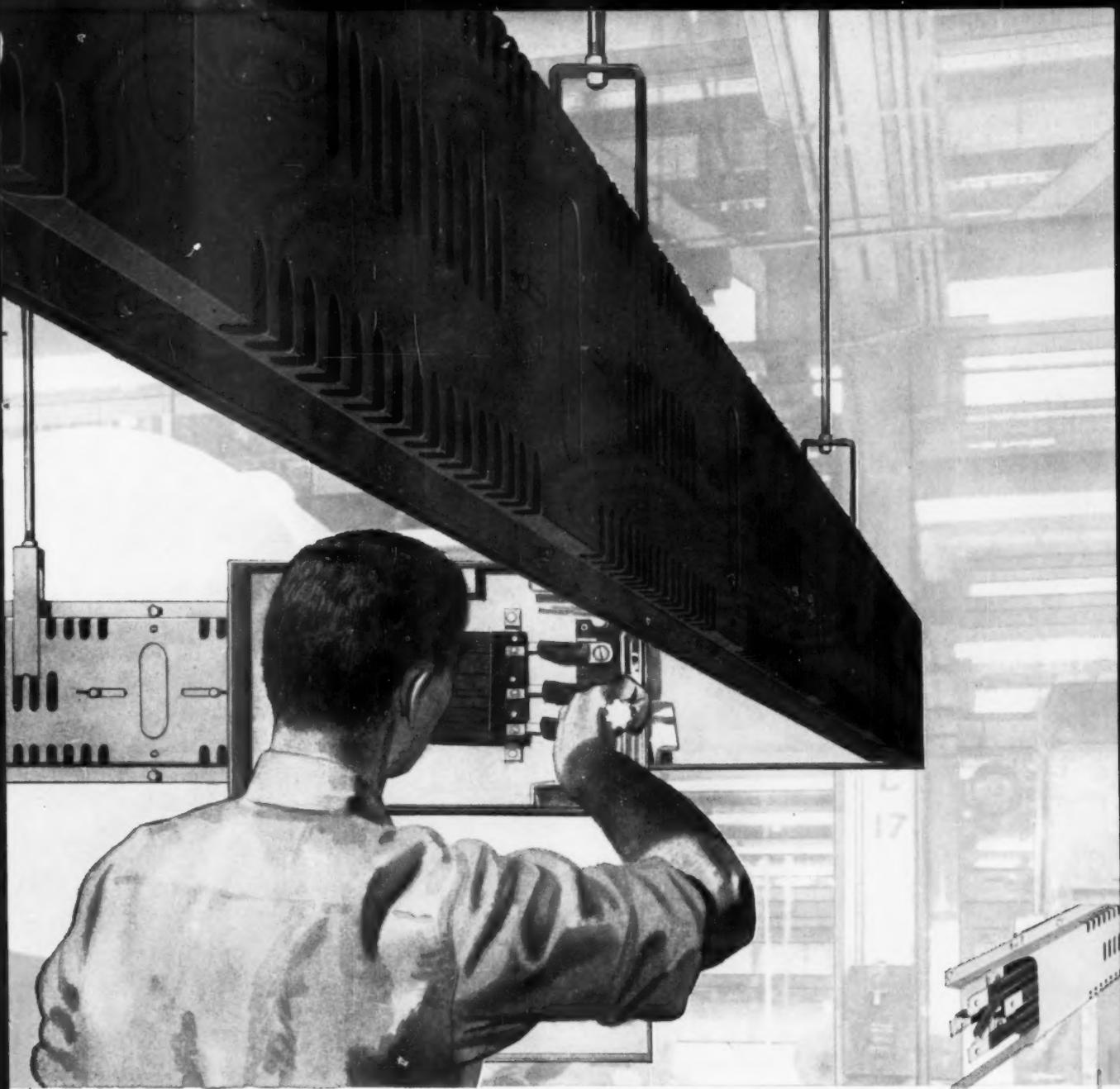
MANUFACTURING CO., INC.
Dept. 117-B, Valparaiso, Indiana

WESTINGHOUSE FOR BUS DUCT



Safest busway you

*Westinghouse Life-Line bus duct gives
workers and management EXTRA protection*



can buy!

The most efficient bus duct in the world is no bargain if it's not absolutely safe. But . . . here's a busway that's both highly efficient and safe. Westinghouse Life-Line® bus duct!

Westinghouse Life-Line bus duct combines cost-saving low impedance characteristics with plug-in convenience—and gives you an all-important extra dividend—a foolproof interlocking safety slide that eliminates exposed live parts.

There's not a chance of touching a hot

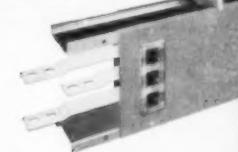
part, even when installing plug-in devices. Every part of the plug-in device is electrically dead, even after it's been mounted on the duct—until the cover has been closed, the contact handle turned to ON.

Of course, Westinghouse Life-Line bus duct has all the features that make bus duct so desirable: light weight; quick and easy installation; flexibility to accommodate growing power demands—and—*important cost savings* on many jobs.

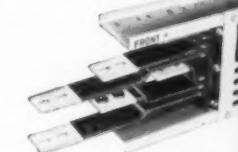
For more detailed information, contact your nearby Westinghouse sales office or write: Westinghouse Electric Corp., Standard Control Division, Beaver, Pennsylvania.

J-30287

Life-Line bus duct

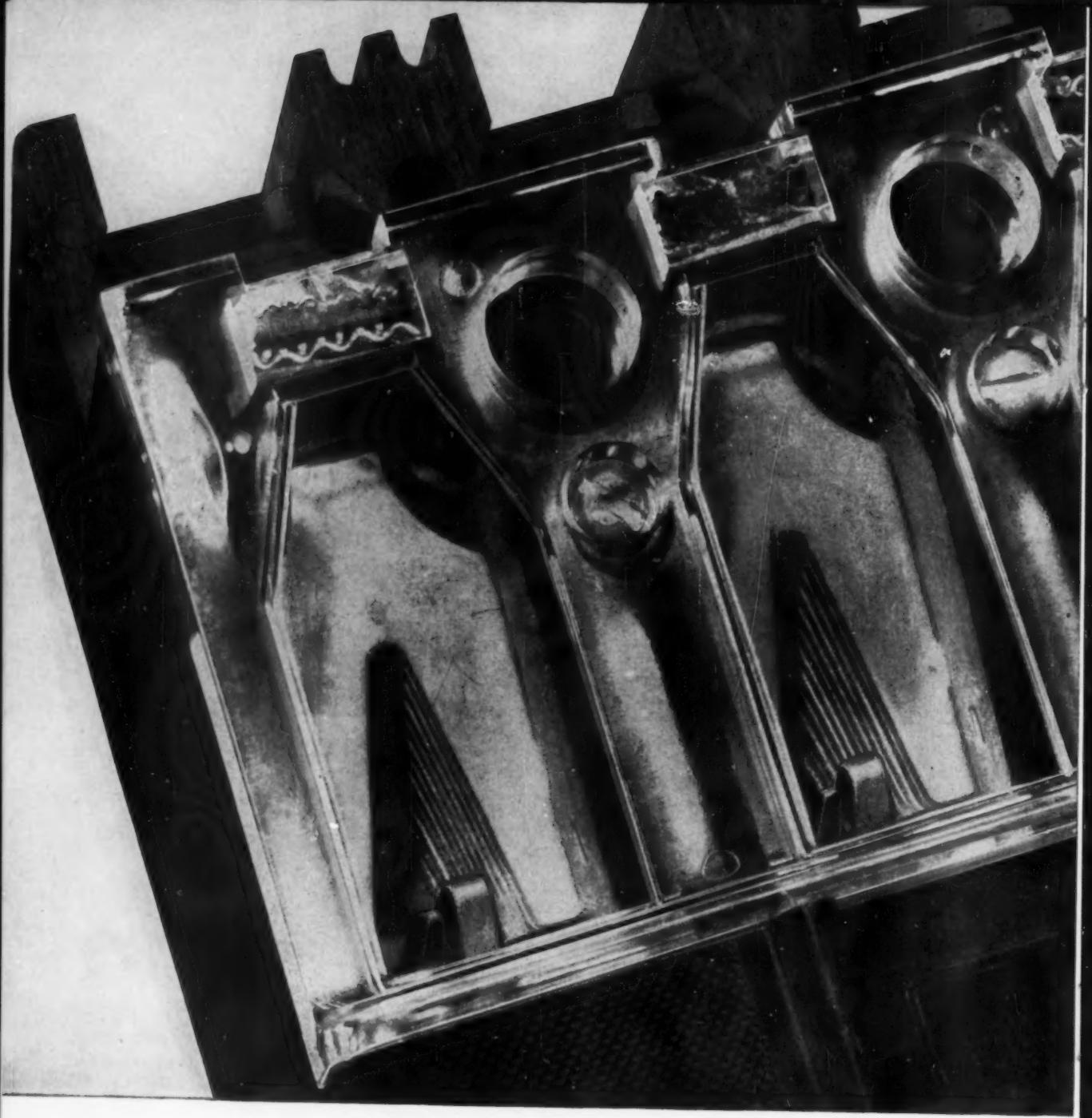


Plug-in duct



Low Impedance duct

YOU CAN BE SURE...IF IT'S **Westinghouse** 



**World's First Breaker
with the Contacts VISIBLE**



Another First by Westinghouse

SAF-T-VUE

Breaker



Everyone who's seen this exciting new development has said "this is the biggest thing in circuit protection since the development of breakers... you're sure the contacts are open (or closed) because you can see through the transparent window."

Of course they're right, and in addition, Westinghouse Saf-T-Vue Breakers have the positive action, tested accuracy, long life and special features that engineers, manufacturers, electricians and contrac-

tors have depended upon for years. Now plants whose safety codes require that contacts be visible can use the most modern form of circuit protection.

See your Westinghouse representative, or write Westinghouse Electric Corporation, Standard Control Division, Beaver, Pennsylvania.

J-30286

YOU CAN BE SURE...IF IT'S Westinghouse





MICRO SWITCH Precision Switches

ARE YOU CASHING IN on the growing demand for automation?

Many electrical contractors serving industrial plants, are designing, installing and maintaining simple and practical automation projects by the application of MICRO SWITCH precision switches to existing production equipment

One contractor is now automating the third plant of one of his industrial customers by smart, intelligent application of MICRO SWITCH precision switches.

Another is saving one industrial plant \$4,000.00 per month through a similar installation.

This is good business—very profitable business—which you, too, can bring into your shop.

There are hundreds of plants using 500 or more MICRO SWITCH precision switches—most of them bought from and installed by a local contractor.

Why don't you go after some of this profitable business? Industrial plants are eager to find out how to economically automate their plants on a simple, practical basis. You can do it—and we'll help you through the efforts of our highly developed Field Sales Engineers and our hundreds of Authorized MICRO SWITCH distributors.

In the meantime, send for catalogs #83 and #101 which tell you all about specific switches for industry. Send for Bulletin 20 on "Plug-in Limit" switch.



MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

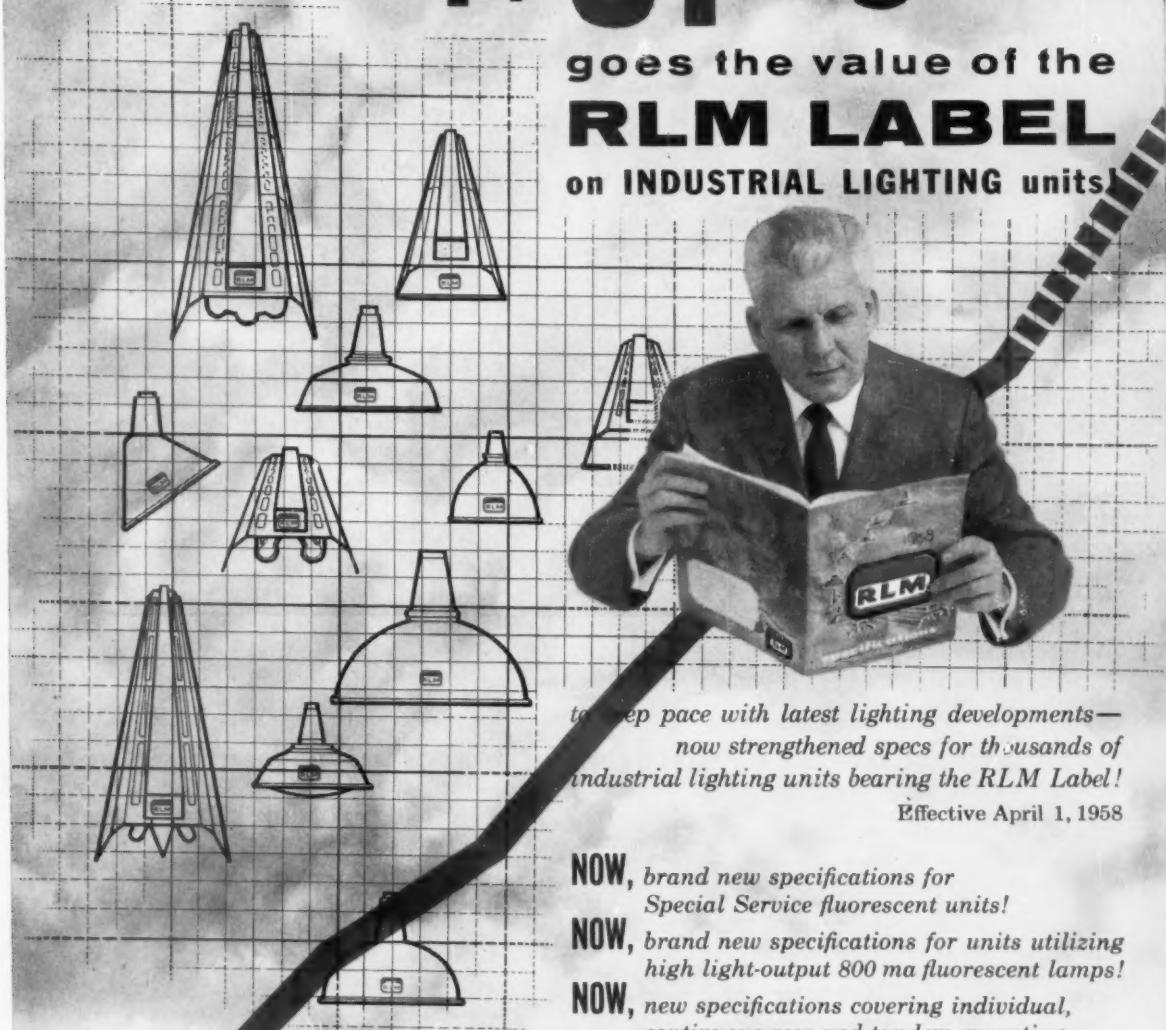


First in Precision Switching

up, UP again!

goes the value of the
RLM LABEL

on INDUSTRIAL LIGHTING units!



YOUR BASIC ASSURANCE OF HIGH QUALITY



This label identifies the RLM-certified
lighting equipment of 26 leading manufacturers

R-233

RLM Standards Institute, Suite 819, 326 W. Madison St., Chicago, Illinois

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . JANUARY, 1958

29

"We cut Electrical Installation Costs and got better protection

... by installing Fusetron Fuses throughout our New Dairy Plant!"

William J. Oyala

ELECTRICAL SUPERVISOR

Fred Meyer Co. Portland, Oregon

Mr. Oyala continues . . .

"In our new dairy plant in Portland, Fusetron dual-element fuses saved us about \$800 by enabling us to use the proper switch sizes for the motor disconnects. This was possible because the long time-lag of Fusetron fuses permitted us to install them in smaller sizes than would have been possible with ordinary fuses.

"In addition, we were able to reduce the space required by the control centers.

"The Fusetron fuses were installed in sizes small enough to give us motor-running protection as well as motor branch circuit protection.

"The result of this has been the prevention of motor burnouts. Not once in the past year of operation has a Fusetron fuse failed to protect a motor. We have 138 motors, ranging from 1/40 H.P. to 100 H.P., and all are protected by Fusetron fuses.

"Both Mr. Eric Christenson, whose company contracted the electrical work, and myself believe that by installing Fusetron fuses throughout our entire plant we got top protection at a cost lower than could have been obtained by any other method."

FUSETRON DUAL-ELEMENT FUSES PROVIDE SAFER, MORE DEPENDABLE PROTECTION

Only Fusetron fuses provide 10 point protection—not possible with any other type of protective device.

Thus, wherever a Fusetron fuse is installed you have safety as sure and dependable as you can buy—no matter what you pay.

AND FUSETRON FUSES REMAIN SAFE THROUGH THE YEARS . . . NO MAINTENANCE COSTS

Once properly installed Fusetron fuses are maintenance free. They require no costly inspection or downtime for calibration and other maintenance necessary on mechanically operated devices.

Dust, fumes, corrosion or age cannot prevent a Fusetron fuse from opening safely. There are no hinges, pivots or contacts to stick or slow down the operation of the fuse on short-circuit.

NO RECALIBRATION COSTS

When a Fusetron dual-element fuse does blow, there is no recalibration needed. As quickly as the fault in the circuit is corrected, you slip in a new fuse. The new Fusetron fuse is just as it came from the factory—accurately calibrated—and ready to give the same safe, dependable, coordinated protection as did the one it replaced.

FOR LOADS ABOVE 600 AMPS.—USE BUSS HI-CAP FUSES to coordinate with FUSETRON Fuses.

On 600 volts or less, BUSS Hi-Cap fuses have an interrupting capacity sufficient to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outage to circuits of origin.

Write for bulletin HCS.

For more information on FUSETRON dual-element Fuses . . . Write for bulletin FIS.

BUSSMANN MFG. DIVISION McGraw-Edison Co.
University of Jefferson, St. Louis 7, Mo.





Play Safe! Install Fusetron dual-element fuses and BUSS Hi-Cap Fuses throughout entire Electrical System!



DON'T YOU MISS THE GREATEST SHOW OF ALL THE 9th BIENNIAL ELECTRICAL INDUSTRY SHOW

(Sponsored by the Electrical Maintenance Engineers Assn.)



For details, contact

Fred J. Tabery, Exhibit Manager, EMEA
3443 South Hill Street, Los Angeles, California
Richmond 9-1091

**SHRINE EXPOSITION HALL
LOS ANGELES, CALIFORNIA
MARCH 27, 28, 29**

This is the PROVEN show for the electrical industry...a SELLING SHOW attracting a QUALITY attendance from the 11 Western states...the most rapidly expanding market in the country according to business experts.

Anyone whose business is related to the design, engineering, use, operation, maintenance, sale or manufacture of electrical and allied equipment — or the application of electricity in the industry — will find this show a MUST.

These and many other firms, representing the WHO'S WHO of the industry, will display their products and services...

Agencies Co.
Air Powered Hot Stick, Inc.
F. J. Airey Co., Inc.
Allen-Bradley Co.
Allied Industries
Allied Masonry Anchors
American Pencor, Inc.
The Louis Allis Company
Anaconda Wire & Copper Co.
Kenneth Anderson Co.
Appleton Electric Co.
The Arrow-Hart & Hegeman
Electric Co.
Automatic Switch Co.
Belden Manufacturing Company
Benjamin Electric Mfg. Co.
Blackhawk Manufacturing Co.
Black & Decker
Brenner-Fiedler Co.
Briegel Method Tool Co.
Brooks Motor Corporation
The Bryant Electric Co.
Buchanan Electrical Products
Bulldog Electric Products
of Los Angeles
Burndy Corporation
Burton Equipment Co.
Clark Controller Co.
Cottrell Paper Products
California Conduit & Cable
Carol Cable Co.
Century Electric Motors

Clayton Mark & Co.
Chester Cable Corporation
Clifton Conduit Co., Inc.
Earl S. Condon Co.
Crouse-Hinds Co.
Cutler-Hammer, Inc.
Continental Wire Co.
Duro Fittings Company
Delco Electric Motors
Diehl Manufacturing Co.
Day-Brite Lighting, Inc.
Electro Capacitors
Emerson Electric Motors
Edwards Company, Inc.
Electro-Tech Products Div.,
Sun Chemical
Equipment Service Company
Electric Tube Products
Encyclopaedia Britannica, Inc.
Empire Electronics
Federal Pacific Electric
Fenwal Incorporated
Fletcher Electrical Specialty Co.
Fluorescent Fixtures of Calif.
Frazier Wright Co.
Furnas Manufacturing Co.
Frankel Connector Company
Feedral Corporation
General Electric Co.
General Radio Co.
Glenmarc Company

Globe Lighting Products
Gedney Electric Co.
Greenlee Tool Company
Hatfield
Heilwig Company
Hill Transformer Co.
Hilli Corporation
Hoffman Electric
Harvey Hubbell, Inc.
Howard Electric Co.
Ideal Industries, Inc.
Iisco Corporation
Insulation Mfg. Co.
Johnson Bearings Co.
Johns Manville Corporation
Jeffries Transformers
Katolight Corporation
Kaiser Aluminum
& Chemical Sales
Lapp Insulator Co., Inc.
Larsen-Hogue Electric Co.
McLoughlin Company
Maddox Sales Co.
Mall Tool Co.
Milwaukee Electric Tool
Mullenbach Div.,
Electric Machinery Corp.
Michel Bros.
Mosley Electronics
National Electrical
Products Corporation

Ray J. Noel Co.
New Hermes Engraving
Machine Corp.
Nye Tool Company
National Parts Distributors
O. Z. Electric Manufacturing Co.
The Ohio Carbon Co.
The Oster Manufacturing Co.
D. W. Onan & Son
Paragon Electric Company
The Jack Payne Co., Inc.
J. G. Pomery
Roy Peck Associates
The Pyle National Co.
Pittsburgh Standard Conduit Co.
Price & Rutzebeck
P-W Industries, Inc.
Preformed Lines Products Co.
Pyramid Instrument Corp.
Republic Steel Corporation
Reliance Electric & Engineering
H. G. Rising, Inc.
The Ridge Tool Co.
The Ruby Lighting Corporation
Rutkin Electrical Sales Company
Russell & Stoll Company
S & M Lamp Co.
Shalda Manufacturing Co., Inc.
Slater Electric & Mfg. Co.
Sierra Electric Co.
Smoot-Holman Co.

Square D Co., Western Division
EC&M Division,
Square D Company
Steber Manufacturing Co.
Standard Carbon Company
Stanco Electric
Products Co., Inc.
The Superior Electric Co.
Sylvania Electric Products, Inc.
Southern Car & Manufacturing Co.
Sunbeam Lighting Co.
The Thomas & Betts Co.
Twinklock, Inc.
The Toledo Pipe Threading
Machine Co.
Tri-State Supply Corporation
U. S. Electrical Motors, Inc.
Velocity Power Tool Co.
Wadsworth Electric Company
Ward Leonard Electric Co.
Western Insulated Wire Co.
Westline Products Div.,
Western Lithograph
Western Tool Industries
Weston Electrical Instruments
Westinghouse Electric
Corporation
Witte Diesel Works
The Wiremold Company
Robert A. Young Co.
Zinsco Electrical Products

Recognizing the vital role of EDUCATION in today's industry EMEA has combined with the 1958 exhibit their 5th ELECTRICAL MAINTENANCE CONFERENCE...highlighting such important subjects as...

- Plan Maintenance to Prevent Breakdown - Large Industry Looks at Maintenance of Electrical Equipment - Small Industry Looks at Maintenance of Electrical Equipment - Commercial Buildings Look at Maintenance of Electrical Equipment - Electronic Equipment Requires Maintenance - Proper Maintenance of Lighting Will Assure Peak Output - How to Estimate Additions and Expansions - High Power Factor Can Pay Big Dividends - Know Your Electrical Codes and Safety Orders - Protective Devices Must Be Properly Selected and Maintained



ATTENTION: NON-SUBSCRIBERS*

*If you are already a subscriber, this is not a renewal notice. Please pass this card along to some other Electrical Contractor or Industrial Chief Electrician, whom you feel would profit by reading and using this monthly estimating, wiring, installation and maintenance help!

*Thirteen Valuable Issues Each Year

ELECTRICAL CONTRACTORS: Worried about where to get new business? Want more profitable electrical jobs? Looking for ways to estimate wiring and installation jobs more closely?

... Then put ELECTRICAL CONSTRUCTION and MAINTENANCE to work for you! Each month you'll read what other electrical contractors are doing to increase their profits with better estimating and wiring methods . . . and how you can apply these money-making ideas to your business!

You get such down-to-earth help as—

- How to figure added costs of wiring jobs dragging past contract time.
- How to analyze your overhead to cut costs.
- How to quickly take-off material requirements.
- What 14 factors besides labor and material affect your job costs.

Whether you are an electrical contractor or industrial plant chief electrician, you'll find, just as over 35,000 other electrical men have, you can rely on ELECTRICAL CONSTRUCTION and MAINTENANCE for help on how to do better electrical estimating, wiring, installation and maintenance at less cost!

Start ELECTRICAL CONSTRUCTION and MAINTENANCE working for you today! To enter your personal subscription just complete and mail the card below! SUBSCRIBE NOW!

Electrical Construction and Maintenance — January — 1958

YES, SIR! I want to know the latest electrical estimating, wiring and maintenance methods! Enter my subscription to ELECTRICAL CONSTRUCTION and MAINTENANCE for a full year's service (13 helpful issues) for only \$3.

Name.....

Title or
Position.....

Home Address Company

City..... Zone.....

State.....

Company Name.....

Nature of
Co. Business.....

I am in charge of electrical work Yes No

Person in charge
of electrical work is.....

Operate a motor repair shop?

Yes No

SEND NO MONEY NOW

Mail card today—We'll bill you later.

Please do not write in this box.
EC -
M -

1/58

YES, SIR! I want to know the latest electrical estimating, wiring and maintenance methods! Enter my subscription to ELECTRICAL CONSTRUCTION and MAINTENANCE for a full year's service (13 helpful issues) for only \$3.

Name.....

Title or
Position.....

Home Address Company

City..... Zone.....

State.....

Company Name.....

Nature of
Co. Business.....

I am in charge of electrical work Yes No

Person in charge
of electrical work is.....

Operate a motor repair shop?

Yes No

SEND NO MONEY NOW

Please do not write in this box.
EC -
M -

Mail card today—We'll bill you later.

1/58

Estimating Help You Can Rely On —

If you are an electrical contractor, landing a wiring or installation job is one thing—but completing it at a profit is another. If you bid too high, you don't get the job—bid too low and you get the job but lose your shirt in the bargain!

If you are an industrial plant chief electrician, you're faced with many of the same electrical estimating problems as the contractor in order to submit an accurate budget to your boss... and check on your costs.

. . . So why take unnecessary chances when you can get your own personal copy of ELECTRICAL CONSTRUCTION and MAINTENANCE each month . . . and have sure-fire, step-by-step electrical estimating and wiring help at your finger-tips!

ELECTRICAL CONSTRUCTION and MAINTENANCE is written for active, hard-hitting men like you. It brings you the actual experiences of electrical men who are beating the problems of wiring, estimating, code interpretation, lighting layout, maintenance and motor repair.

NOW — 13 issues each Year!

As part of the regular subscription service, ELECTRICAL CONSTRUCTION and MAINTENANCE now publishes in Mid-September the big NEW "ELECTRICAL PRODUCTS GUIDE" issue. The "EPG" is your year 'round guide to "who-makes-what" and "where-to-buy" product information. It's the only complete . . . and completely verified . . . reference on electrical apparatus and supplies, utilization equipment, tools and accessories!

"Questions on the Code" each month . . .

A special feature of ELECTRICAL CONSTRUCTION and MAINTENANCE each month is the "Questions on the National Electrical Code". Here new requirements are explained and analyzed. You're shown how to comply with every specification yet keep your costs and working time to a minimum. Whether you're an electrical contractor, or chief electrician of a plant this code information alone is worth more than the subscription price!

Send no money now—we'll bill you later

Just complete and mail the subscription card below. We'll send a statement later for the small subscription fee—only \$3 for a full year's service (13 big, helpful issues).

ENTER YOUR SUBSCRIPTION TODAY!

Electrical Construction and Maintenance • January • 1958

—TEAR ALONG LINES—



BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 64, NEW YORK, N.Y.

4¢ POSTAGE WILL BE PAID BY—

MCGRAW-HILL PUBLISHING CO., INC.

ELECTRICAL CONSTRUCTION & MAINTENANCE
330 WEST 42ND STREET
NEW YORK 36, N.Y.



BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 64, NEW YORK, N.Y.

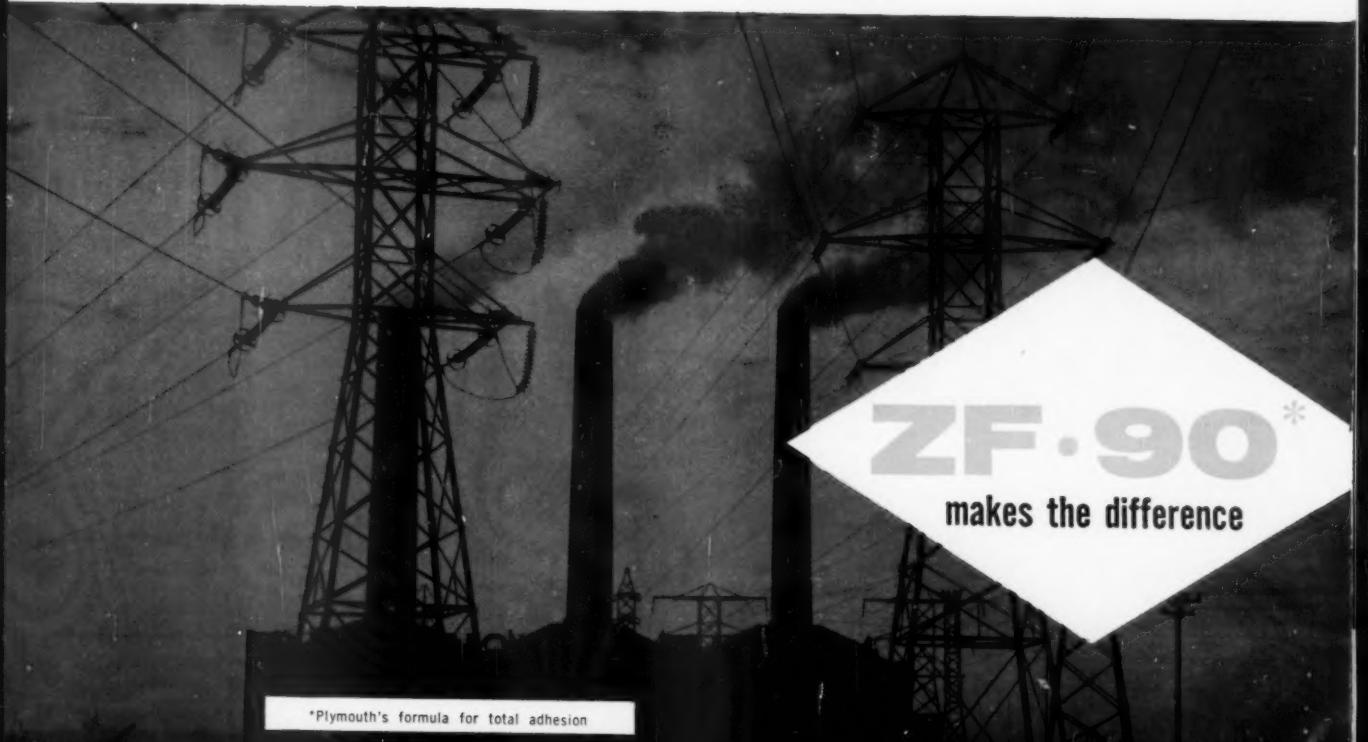
4¢ POSTAGE WILL BE PAID BY—

MCGRAW-HILL PUBLISHING CO., INC.

ELECTRICAL CONSTRUCTION & MAINTENANCE
330 WEST 42ND STREET
NEW YORK 36, N.Y.



NEVER BEFORE
A PLASTIC TAPE
LIKE THIS —→



ZF·90*

makes the difference

GET TOTAL

new SLIPKNOT #7
...inseparable fusion



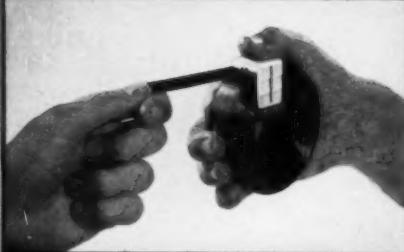
A COST-CUTTER PACKED
IN EVERY CAN!

QUICK, CLEAN CUTS WITH THE
NEW SLIPKNOT PLASTIC CUTTER

NOW . . . a new, exclusive, (pat. pending) tape cutter, developed by Plymouth for sure, easy cutting, is packed FREE* in every 66-ft. can . . . to cut without waste, even in the tightest spots! Plastic, non-conducting.



NO MORE OF THIS!



NOW - CUT CLEAN, QUICKLY!



ALWAYS HANDY - PACKS IN CORE!

*Limited time offer



ADHESION

PLASTIC TAPE with ZF-90* for permanent protection

AT LAST . . . a vinyl electrical tape you *know* you can depend on! New SLIPKNOT #7 is superior to any plastic tape you've ever known!

ZF-90* inseparably fuses special adhesive to vinyl base; they *cannot come apart*, and therefore *will not dry out*. This is *total adhesion*, making splicing easier, swifter, surer than ever before!

Thus Plymouth creative research has developed a plastic tape that will, with only moderate tension, pull down tightly and hold permanently on *every* job, without creeping or thinning, untroubled by field conditions under which ordinary plastic tapes often fail.

New SLIPKNOT #7 has a wider temperature working range, too, than other plastic tapes. ZF-90* makes the difference. This new tape has successfully passed the most rugged laboratory and field tests ever devised. It will pass all of yours, too.

New SLIPKNOT #7 is tough — abrasion-resistant, yet resilient and easy to handle, molding totally around any job. It permanently resists the attack of water, acids, alkalies, oils and corrosion. And just *one .007"* layer has a dielectric strength of 10,000 volts!

Why settle for partial protection when you can get *total adhesion* with new SLIPKNOT #7 PLASTIC ELECTRICAL TAPE? Don't wait another day to try it. It's at your distributor's now.

* Plymouth's formula for total adhesion



Temperature, 94°. Humidity, 99%. Electrical conditions — just about the worst in the world! New Slipknot Plastic Tape went to the offshore oil fields of Dutch Guiana — and it's still there, on-the-job through salt, heat and wet, that never let up!



Years of punishment ahead! New Slipknot Plastic Tape splices the original wiring in the Tween-decks of an ocean-going tanker, where salt water and oil will do their worst work! New Slipknot proves its worth on all jobs!



How dry and gritty can you get? New Slipknot Plastic Tape goes to work in the high desert country, where the winds blow constantly! In wider form, wraps pipelines — its anti-corrosion and abrasion-resistant properties are excellent!

PLYMOUTH RUBBER COMPANY, INC.
Makers of SLIPKNOT FRICTION TAPE

DIVISION 15

CANTON, MASSACHUSETTS

Anticipation . . .

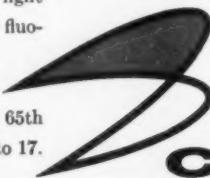
the heart of creation



Trust Dept. First National Bank, Chicago, Illinois.

*From the foresight of Curtis Visioneers comes the New Eye Comfort Troffer with L.B.Q.**

A 60-year history of developing new advancements in planned lighting must be respected. Not surprising, then, that credit for the exclusive Eye Comfort® Troffer with *low-brightness quality goes to Curtis visioneers. Who are the Curtis visioneers? Vision-engineers. Illuminating engineers who scientifically plan, design, manufacture and oversee installation of lighting systems that assure visual acuity, provide visual comfort, under any conditions. They are engineers not only of vision but *with* vision. The vision to pioneer with innovations like the revolutionary new Curtis Eye Comfort Alzak Aluminum Troffer . . . first luminaire to have a *true parabolic-shaped fin* of heaviest gauge aluminum—the extruded L.B.Q. louver. Result is high level illumination . . . shadowless low-brightness quality . . . wherever light is cast. Meets the demands, too, of those who specify and buy fluorescent lighting for *quality illumination—long-run economy*. Write today for the name and address of the Curtis representative in the principal city nearest you. Curtis Lighting Inc., 6135 W. 65th Street, Chicago 38, Ill. In Canada: 195 Wicksteed Ave., Toronto 17.



CURTIS

Visioneers in Planned Lighting®





when good designers get together...

They recommend connectors made the ILSCO way because they know they get these important added benefits:

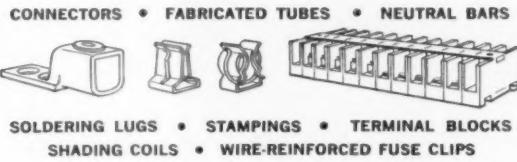


- 100% pure electrolytic seamless copper gives Ilsco connectors 100% conductivity. The copper is cold-worked to preserve its natural properties.
- Compact, light-weight Ilsco connectors possess strength, secureness and capacity *equal to or*

greater than much heavier and larger cast alloy types. You save space, handling trouble and money.

Ilsco connectors do not overheat. Under normal conditions, operating temperatures remain as much as 50% below permissible Underwriter Laboratories maximums. That means greater safety, fewer trouble spots in your layout.

Join the ranks of Ilsco's satisfied customers. Find out how much time, trouble, worry and hard cash you can save. Write for your free copy of Catalog #50 and samples. Dept. C-1.



ILSCO

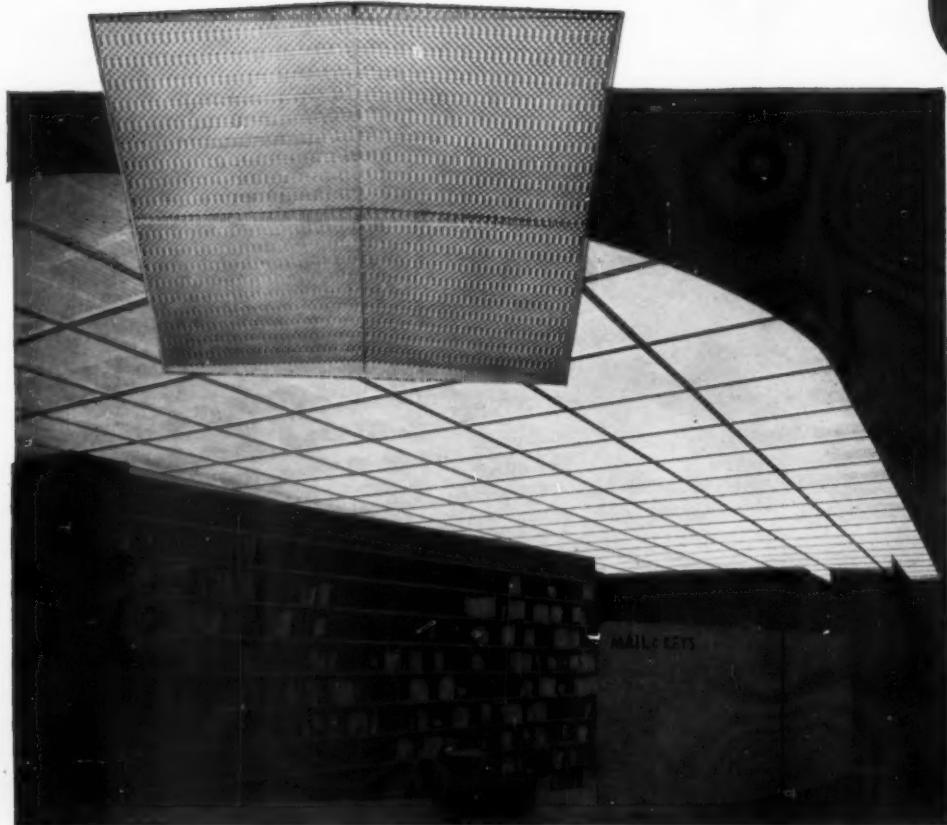
C O R P O R A T I O N
4730 Madison Road • Cincinnati 27, Ohio, U.S.A.

Ilsco of Canada, Ltd., 25 Carson St., Toronto, Ontario



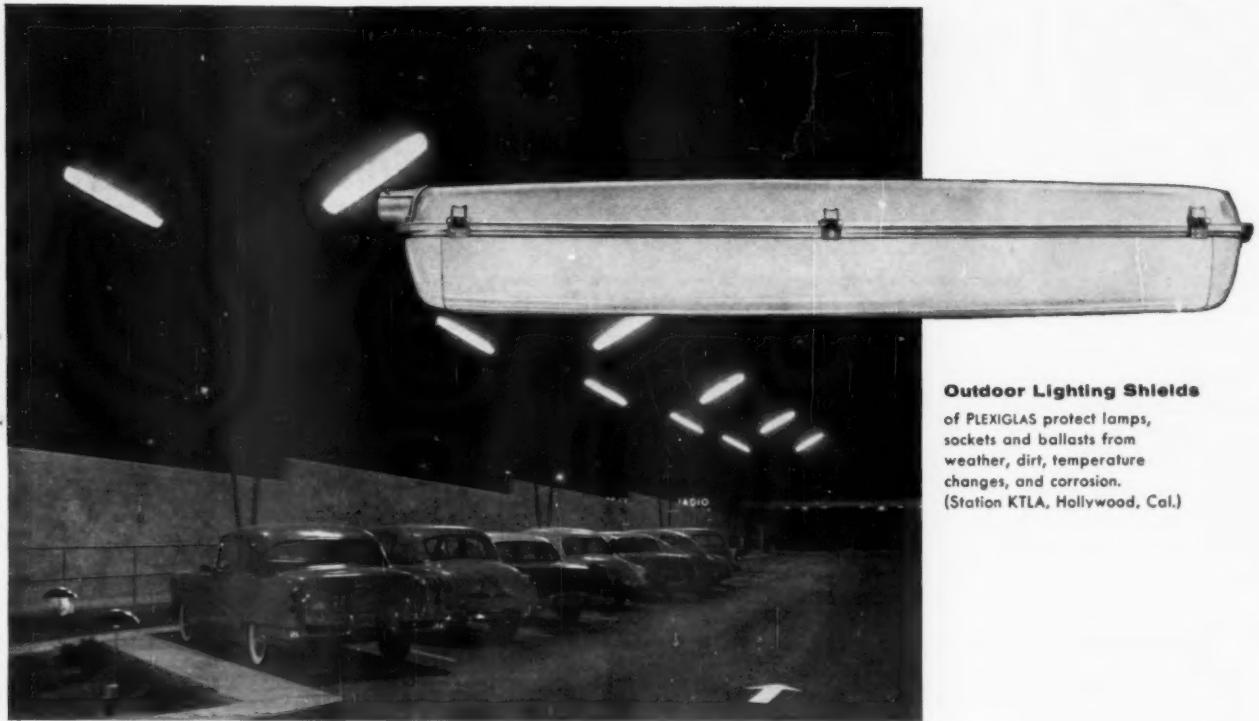
Light Diffusers

formed from PLEXIGLAS sheet give efficient, uniform illumination with low surface brightness.
(Provident-Tradesmen's Bank & Trust Co., Philadelphia)



Light Control Lenses

made from PLEXIGLAS molding powder provide a high level of downward light with complete visual comfort, and give beauty and safety overhead.
(Hotel Cleveland, Cleveland)



Outdoor Lighting Shields

of PLEXIGLAS protect lamps, sockets and ballasts from weather, dirt, temperature changes, and corrosion.
(Station KTLA, Hollywood, Cal.)

PLEXIGLAS

...answer to almost any lighting problem

Indoors or outdoors . . . wherever light must be transmitted, controlled, diffused or protected . . . you'll find the job being done best by equipment that incorporates PLEXIGLAS® acrylic plastic. Lighting engineers, contractors, architects, and their clients, prefer such equipment because PLEXIGLAS has the following advantages:

- ... highest efficiency in light transmission and diffusion
- ... light weight and strength, for structural simplicity
- ... resistance to weather and breakage, for long life and low maintenance
- ... economically formed or molded to almost any shape and size
- ... freedom from discoloration by fluorescent light

These advantages add up to lighting of the highest quality. To obtain them, be sure the equipment you select has diffusers, lenses or shields of PLEXIGLAS. For sources of supply, just fill in and mail the coupon below.



Chemicals for Industry

**ROHM & HAAS
COMPANY**

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Canadian Distributor: Crystal Glass & Plastics, Ltd.,
130 Queen's Quay East, Toronto, Ontario, Canada

ROHM & HAAS COMPANY
Washington Square
Philadelphia 5, Pa.

Please send the names of manufacturers of lighting equipment with
PLEXIGLAS Diffusers, Light Control Lenses, Weather Shields.

Name. _____

Firm. _____

Address. _____

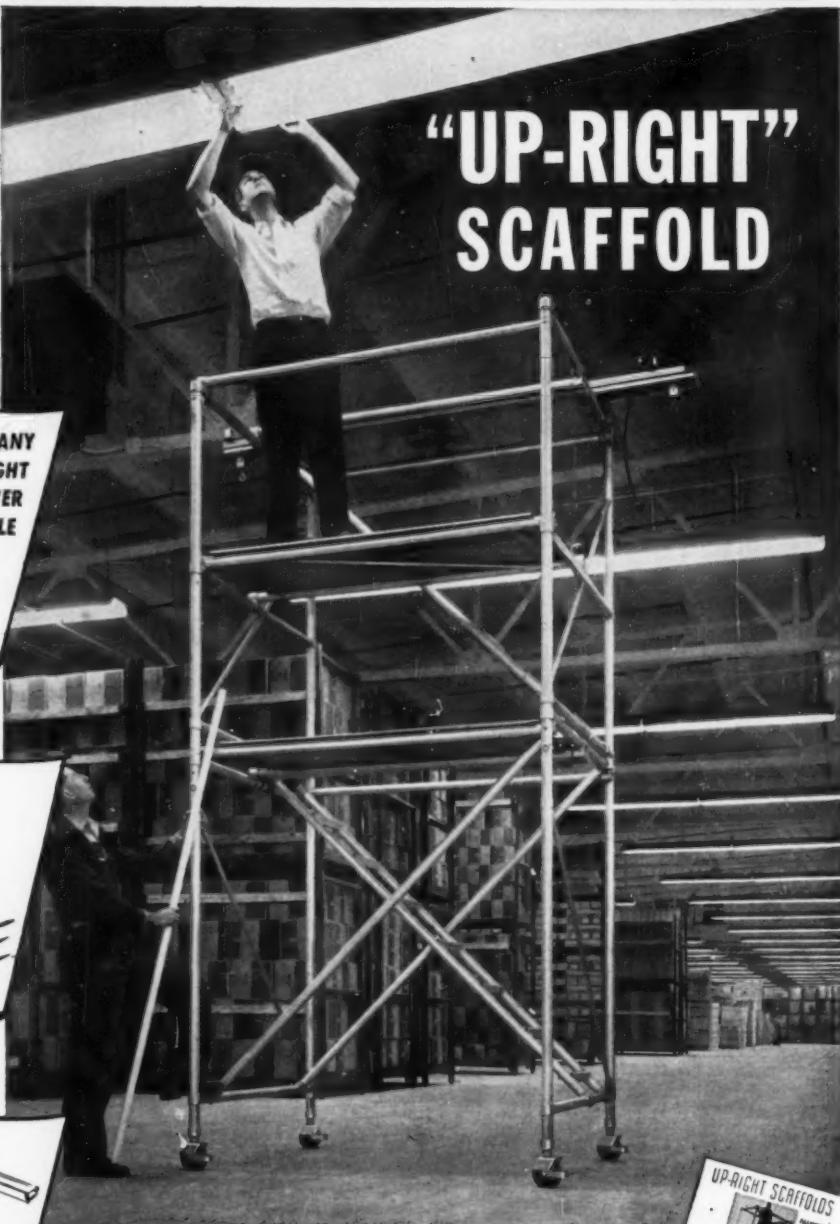
(P7-24) City. _____ Zone. _____ State. _____



WALTER D. VANCE, JR., Vice President • California Electric Co., reports:

**"We saved 14 days installing
527 fixtures by using
'UP-RIGHT' Scaffold-on-Wheels"**

Man-hour savings on this General Motors warehouse job amounted to over 40%. Up-Right Scaffold is so light it is easily assembled by one man. Individual 1 piece aluminum alloy sections are unfolded and set one on top of the other. They lock into place instantly.



Write for descriptive circular →
"UP-RIGHT" SCAFFOLDS

Dept. 159 • 1013 Pardee Street • Berkeley, California
Factories: Berkeley, Calif. and Teterboro, N. J. Offices in all principal cities





Save 10¢ OR MORE

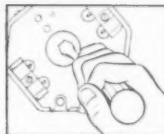
on every Factory Assembled
Set-Up Box you
install with ...

SET-UP BOXES

on Adjustable and Solid
bar hangers

Assembled . . . Ready For The Job!

**AVOID THESE COSTLY STEPS ON THE
JOB BY USING RACO SET-UP BOXES!**



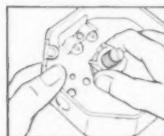
1 Remove center KO in bottom



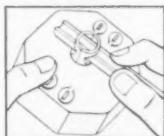
2 Loosen stud set-screw and separate bars



3 Remove stud assembly



4 Position stud assembly in center KO of box



5 Insert female bar section through saddle and assemble both sections of bar



6 Tighten stud set-screw

It costs you 12¢ at average labor rates, to have your men assemble a box on a bar. You can buy the same box and bar factory assembled for an assembly charge of about 2¢. You save 10¢ on every set-up box you install . . . a substantial dollar savings to add to your profits.



**YOU CAN'T ASSEMBLE
FOR 2¢!
TRY IT!**



**ALL-STEEL EQUIPMENT INC.
Aurora, Illinois**

**More features
at your call
at the
lowest price
of all**

\$39⁸⁵



**RS-1 — the volt-ammeter
with the most-used ranges**

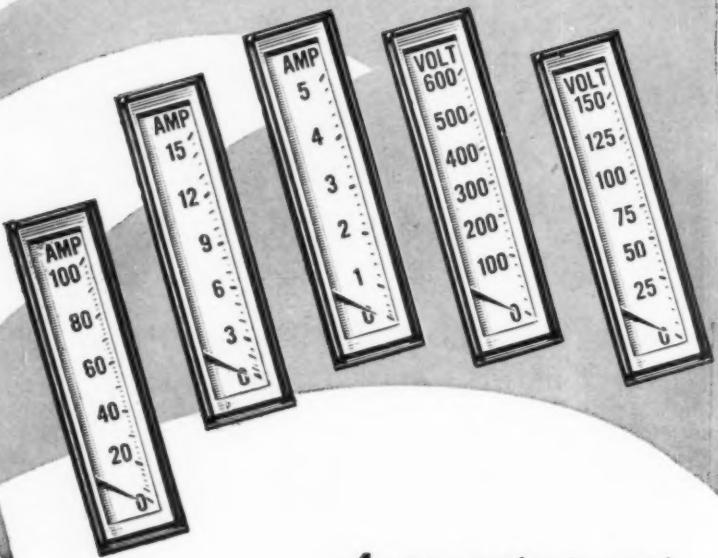
There's one for every job and every budget.

The new RS-1 is one of the 14 AMPROBE models priced from \$19.85 to \$67.50.

* ®

AMPROBE RS-1

see only one scale at a time!



4 ways easier to read

than any other test instrument of its kind!

1. INGENIOUS ROTARY SCALES. 4 current ranges, 2 voltage ranges — each on a scale of its own!

2. ONE HAND OPERATION! Range selector knob is next to your thumb.

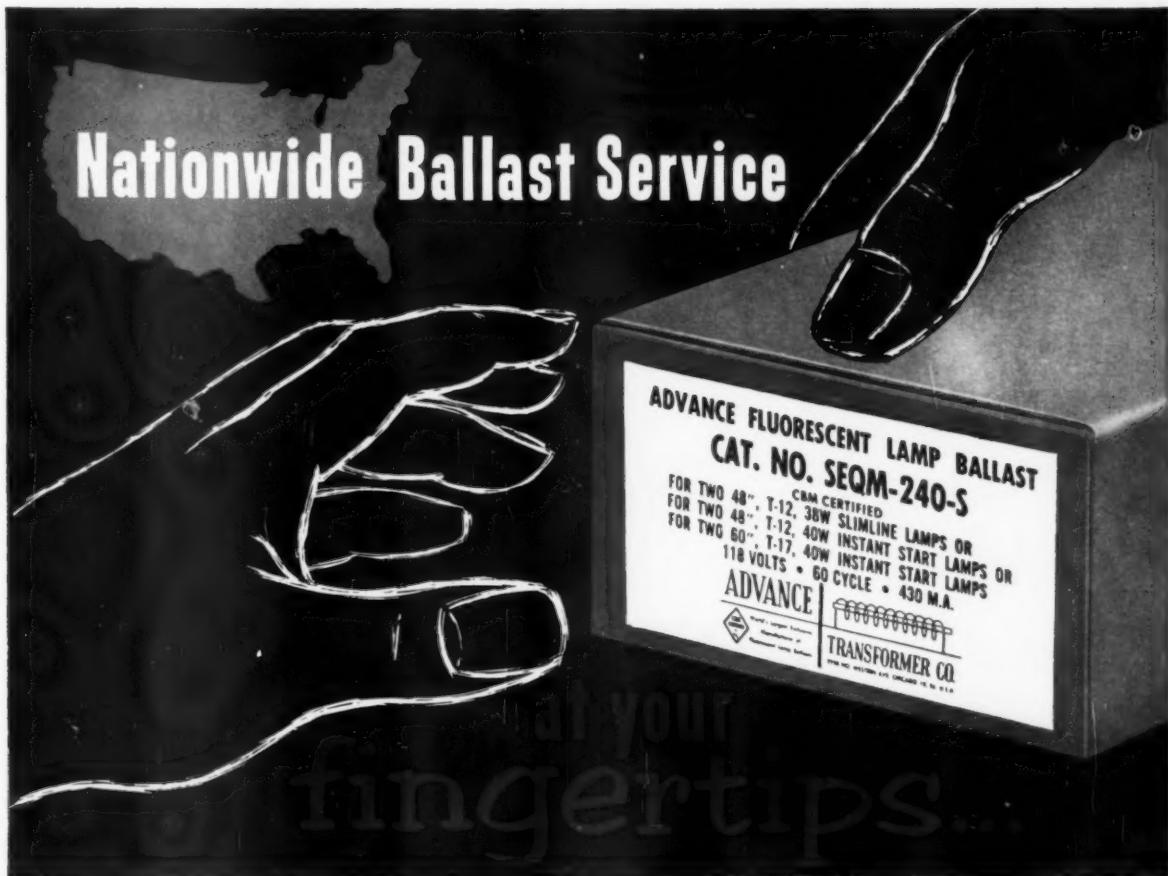
3. NEW MAGNIFIED DIAL... LONGER SCALE LENGTH. Greater visibility, greater accuracy, than ever before.

4. POINTER-LOCK "FREEZES" POINTER AT READING. Use the RS-1 any place your hand can reach. Needle can be locked in place so that you may read it away from conductor.

OTHER ADVANCED ENGINEERING FEATURES: Range-selector knob is recessed so that it can't be moved accidentally. Simple bayonet leads lock in at bottom for quick connecting. Impact-proof case with non-slip ribbing. Advance printed circuit construction. Shielded core magnetic movement. Leather carrying case can be worn on your belt.

Amprobe, a division of Pyramid Instrument Corp., Lynbrook, New York, manufacturers of famous REMCON simplified low-voltage Hi-Fashion switching devices.

don't guess at it; AMPROBE IT!



ADVANCE® Service Stocking Distributor Plan

Makes Fluorescent Lamp Ballast Servicing Simple . . .

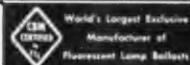
The new ADVANCE Buyer's Guide, the Cross-reference Fluorescent Lamp Ballast Replacement Chart together with the newest brochure listing authorized ADVANCE Service-Stocking Distributors will be sent to you without cost or obligation. Write today!

The ADVANCE Fluorescent Lamp Ballast Servicing Plan saves time and money for electrical contractors, lighting equipment manufacturers, engineers, electric utilities, architects and users of fluorescent lighting equipment. To serve you in this program ADVANCE, the world's largest exclusive ballast manufacturer, has appointed a nationwide network of service-stocking distributors. These authorized distributors carry a complete stock of ADVANCE ballasts and will replace, WITHOUT CHARGE, any ADVANCE ballast which becomes inoperative within the two-year warranty period. From this ADVANCE stock, which includes ballasts to operate all fluorescent lamps, you can also get immediate replacement service for any other make ballast.

ADVANCE QUALITY Fluorescent Lamp Ballasts are packaged in modern individual cartons that put an end to loose dangling lead wires, prevent damage to lead wire and assure you of factory fresh ballast stock always. End labels on the new individual cartons permit instant identification of ballast type, catalog number and pertinent electrical characteristics.

The ADVANCE label is assurance of dependable, efficient performance at lowest cost . . . the result of years of engineering and development that have made ADVANCE fluorescent lamp ballasts "The Heart of The Lighting Industry".

ADVANCE



World's Largest Exclusive
Manufacturer of
Fluorescent Lamp Ballasts



TRANSFORMER CO.
2950 NO. WESTERN AVE. CHICAGO 18, ILL. U.S.A.

The Heart of the Lighting Industry



Used by **MORE CONTRACTORS** than any other brand- **BY MILLIONS** **EVERY YEAR!**



WIRE CONNECTORS

IDEAL *Wire-Nuts*[®]
CONNECTORS

the lifetime-tight, wire crushing grip that **NEVER LET'S GO!**

- just screw them on — like a nut on a bolt!
- Use new "Wire-Nut" wrench if you like.
- Screw-and-lever and wedge action with **FORCE OF UP TO 2½ TONS** flattens wires and multiplies contact area

NOW —
BETTER THAN EVER

Stronger!
Closer tolerances!
Easier to Use!

SHAKE-PROOF! PULL-PROOF!
FLASH-PROOF! HEAT-UP PROOF!

CRIMP CONNECTORS

with the UNIQUE

"Wrap-Cap"

(Patented)
INSULATOR

A stronger crimp sleeve of cadmium plated steel, diaper-wrapped in perfect, pre-fabricated insulation all-around and double protected over wire ends. Best of the crimp connectors!



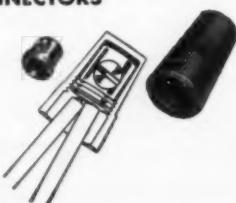
All IDEAL Wire Connectors in all contractor sizes are UL listed as pressure cable connectors, for general use (600 V.) in branch circuit and fixture wiring.

SOLD THROUGH AMERICA'S LEADING DISTRIBUTORS
In Canada: Irving Smith, Ltd., Montreal



SET-SCREW CONNECTORS

Set 'em and see 'em! A screw driver's all you need. Permits visual inspection of every joint. A breeze to re-use when making circuit changes. Solid brass sleeve and set-screw — long-skirt, highest dielectric shell.



IDEAL INDUSTRIES, Inc.
1041-A Park Avenue, Sycamore, Ill.

Please send full catalog data on

IDEAL "WIRE-NUTS" IDEAL CRIMP CONNECTORS
 IDEAL SET-SCREW CONNECTORS

Name _____

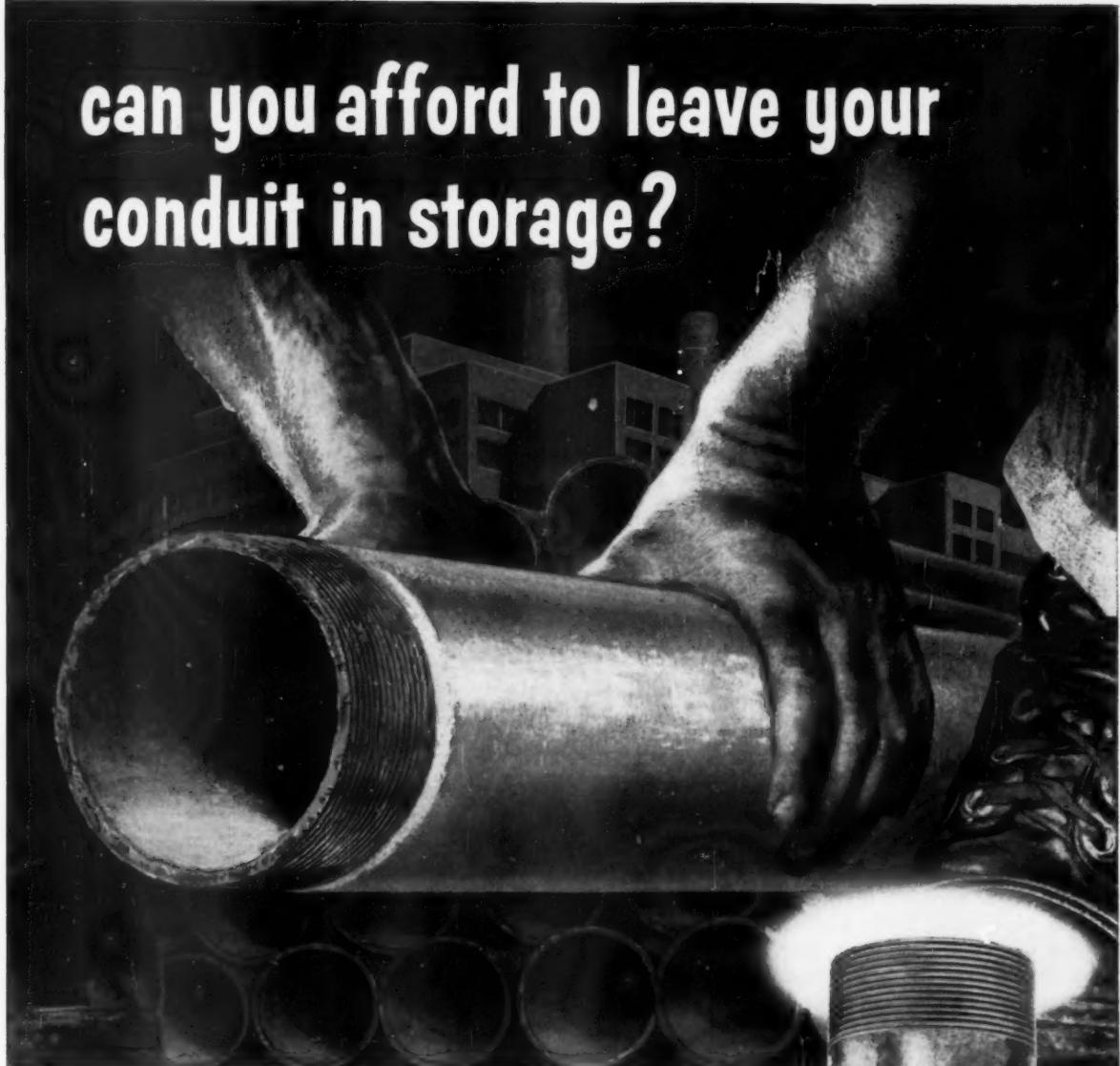
Company _____

Address _____

City _____ Zone _____ State _____



can you afford to leave your conduit in storage?

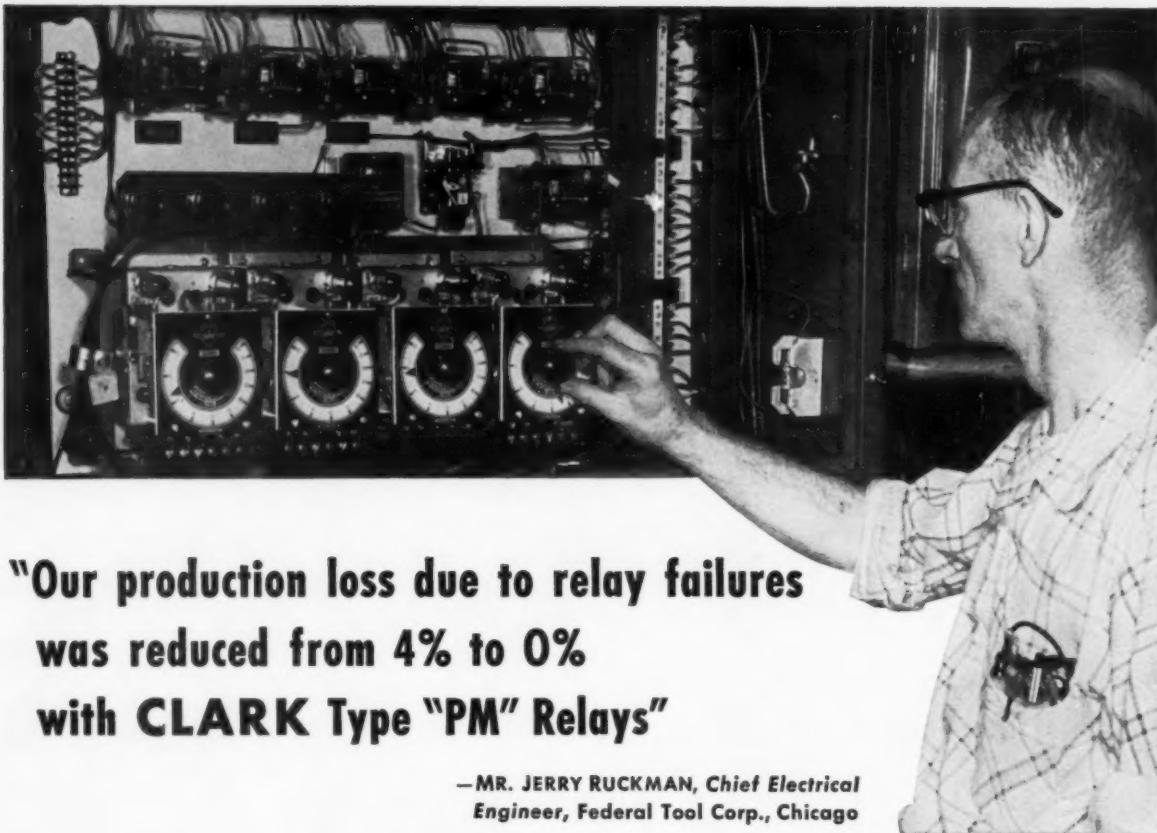


YOU CAN IF IT'S PITTSBURGH STANDARD'S HOT-DIP GALVANIZED WITH HOT-DIP GALVANIZED THREADS

The extra labor, the extra time that it takes to chase rusty threads on conduit which has lain in storage is very costly. It very often nullifies the savings realized through purchases made ahead of price adjustments. That's why Pittsburgh Standard's exclusive Hot-Dip Galvanized Conduit with *hot-dip galvanized threads* is the least expensive conduit . . . always ready to use . . . threads just can't get rusty. And because of the industry's most automatic conduit mills, this conduit with color-coded thread protectors on $\frac{1}{2}$ through 6 inch sizes is available at no extra cost! Get delivery and price information by calling or writing your nearest Pittsburgh Standard wholesaler or *Pittsburgh Standard Conduit Co., 61 Bridge Street, Pittsburgh 23, Pa.*

PLANTS AT MORRISVILLE & ETNA, PA.
RIGID STEEL CONDUIT • ELECTRICAL METALLIC TUBING • ELBOWS • COUPLINGS • FITTINGS

**PITTSBURGH
STANDARD**
CONDUIT CO.



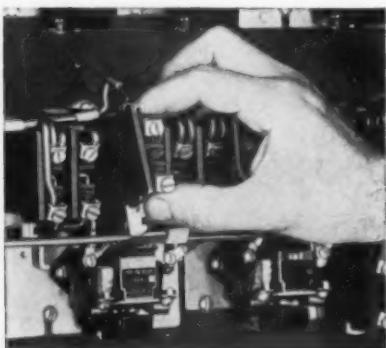
**"Our production loss due to relay failures
was reduced from 4% to 0%
with CLARK Type "PM" Relays"**

—MR. JERRY RUCKMAN, Chief Electrical
Engineer, Federal Tool Corp., Chicago

Explains Chief Engineer Ruckman: "We turn out plastic housewares, haircurlers, toys, premiums and other plastic products by the hundreds of thousands every twenty-four hours. Demand is high. Customers insist on prompt delivery. That's why we were so concerned over the erratic operation of the relays in our molding machine control panels—the heart of our production line.

"We found that non-conductive plastic dust was collecting on the relay contacts, causing them to fail. When this happened, production was halted. Losses amounted to four percent.

"Two years ago we installed Clark Type PM relays, in which each set of contacts is shielded by its own melamine housing. Production stoppages from plastic dust have been cut to zero."



**The unique sectional pole construction of the Clark
Type "PM" relay offers many other important advantages**

Compact, it's a space-saver. Rugged, it has built-in protection against vibration damage. Simple, it is easy to install and service. Each pole is a self-contained unit that can be removed, installed or replaced without disturbing the others. All terminals are in front for easy accessibility. Each pole has its own individual arcing chamber—a short circuit through one set of contacts is confined to a single pole, and will not destroy the entire relay.

The CLARK  **CONTROLLER Company**

Everything Under Control

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

1146 East 152nd Street • • Cleveland 10, Ohio

GUTH-LIGHT guards THE EYES OF TEXAS!



4,200
GUTH TROFFERS . . . ALZAK ALUMINUM LOWEST
LOW-BRIGHTNESS TROFFERS IN NEW
U.S.A.A. BUILDING, SAN ANTONIO



ARCHITECTS: Phelps & Dewees & Simmons-Atlee
B. & Robt. M. Ayres, San Antonio

ELECTRICAL DISTRIBUTOR: Southern Equipment Co., San Antonio

ELECTRICAL CONTRACTOR: Paul Wright Electrical Co., San Antonio

STRUCTURAL ENGINEERS: Matthews & Kenan, San Antonio and

Beretta, Greenslade, Clark & Collins, Inc., San Antonio

MECHANICAL ELECTRICAL ENGINEERS: Gerard M. Baker, San Antonio,
and Beretta, Greenslade, Clark & Collins, Inc., San Antonio

Texans think big and demand the best! That's why designers chose Guth Troffers for the magnificent new home office of United Services Automobile Association, San Antonio.

Their distinctive, custom-made look adds beauty to the contemporary decor . . . the shadowless, low-brightness lighting (with at least 65 ft. candles throughout) assures eye-ease and efficiency. What a combination!

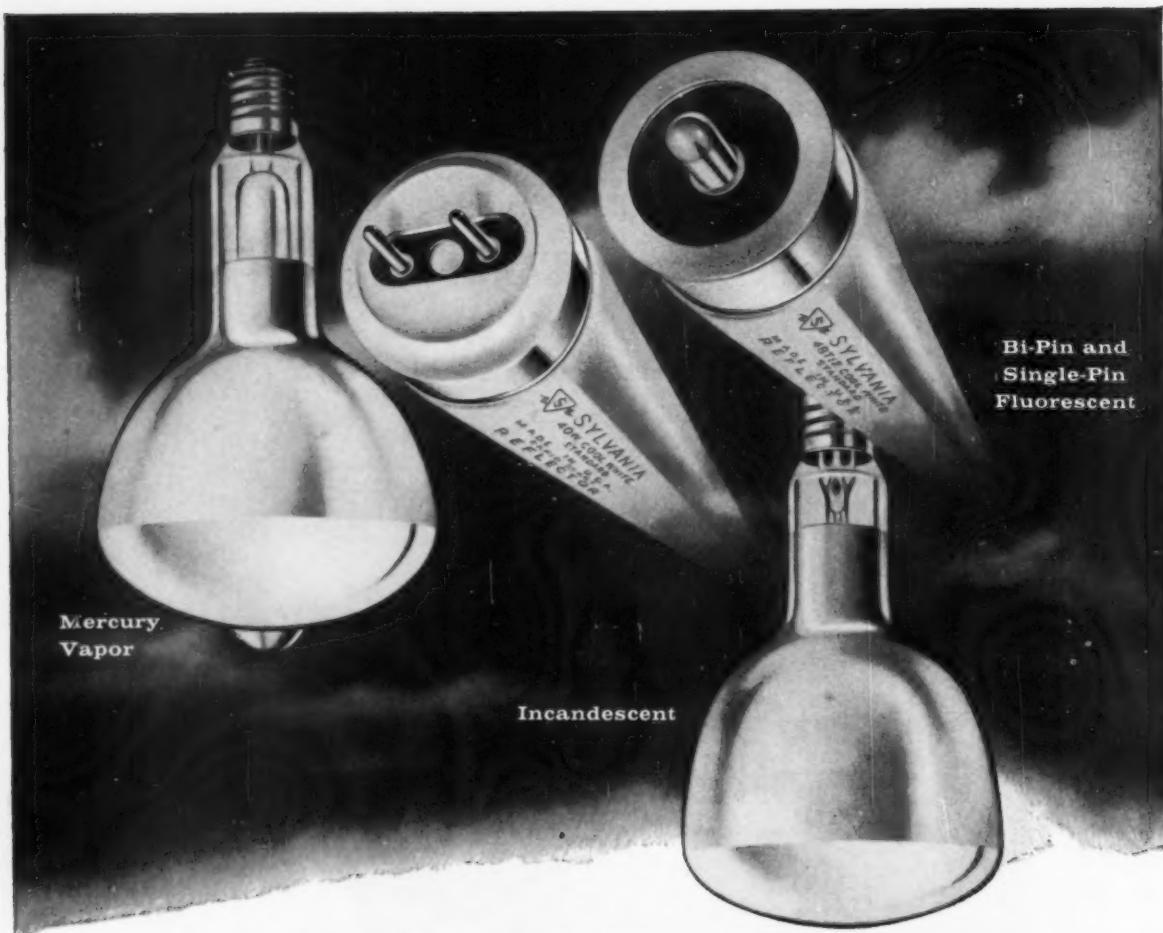
And more: Guth's complete-unit design made the installation double-easy. No on-the-job assembly . . . they're ready to hang.

WRITE FOR GUTH TROFFER CATALOG NO. 50-A



COMPANY • ST. LOUIS 3, MO.

TRUSTED NAME IN LIGHTING SINCE 1902



All 4 offer more light—save more money because Sylvania puts the reflector inside

Regardless of your lighting requirements — there's a Sylvania reflector lamp that can help reduce your lighting costs.

Sylvania reflector lamps give you more usable light without increasing power costs. You eliminate frequent, costly reflector and fixture cleaning expense. You get a higher degree of efficiency because light-dimming dirt, dust and grime can't affect the sealed-in reflector.

Sylvania reflector lamps are available in all 3 major lamp types:

Mercury Vapor (KS-H1) — a highly efficient 400 w. Silver-White lamp that combines the advantages of an internal reflector lamp with the economies of

mercury vapor lighting. Its 23,000 lumens represent an important increase of over 20% in light output compared to other types of mercury vapor lamps of the same wattage.

Fluorescent — You get up to 60% more directed, usable light with Sylvania's Reflector Fluorescent Lamp. Available in single-pin and bi-pin types, they are made in a broad range of colors and sizes. They are particularly suited for industrial lighting, for bare-lamp strip lighting, and directed light in store windows, coves, valances, etc.

Incandescent — Sylvania Incandescent Reflector and Projector Lamps are available in "spot" and "flood" types. "Spots" concentrate a beam of high in-

tensity, while "floods" give a wider, more diffused beam. Reflector lamps are suitable for high-bay industrial lighting, and close visual assembly work, parking areas, etc. Projector lamps are better for area floodlighting and general outdoor applications, or for interior industrial auxiliary lighting and many commercial applications.

Let your Sylvania Supplier demonstrate the dollars-and-cents advantages of high-efficiency reflector lamp lighting. Call him today, or write for information to:

SYLVANIA ELECTRIC PRODUCTS INC.
Lighting Division, Dept. 8L-8301
60 Boston Street, Salem, Mass.

In Canada: Sylvania Electric (Canada) Ltd.
Shell Tower Building, Montreal

SYLVANIA

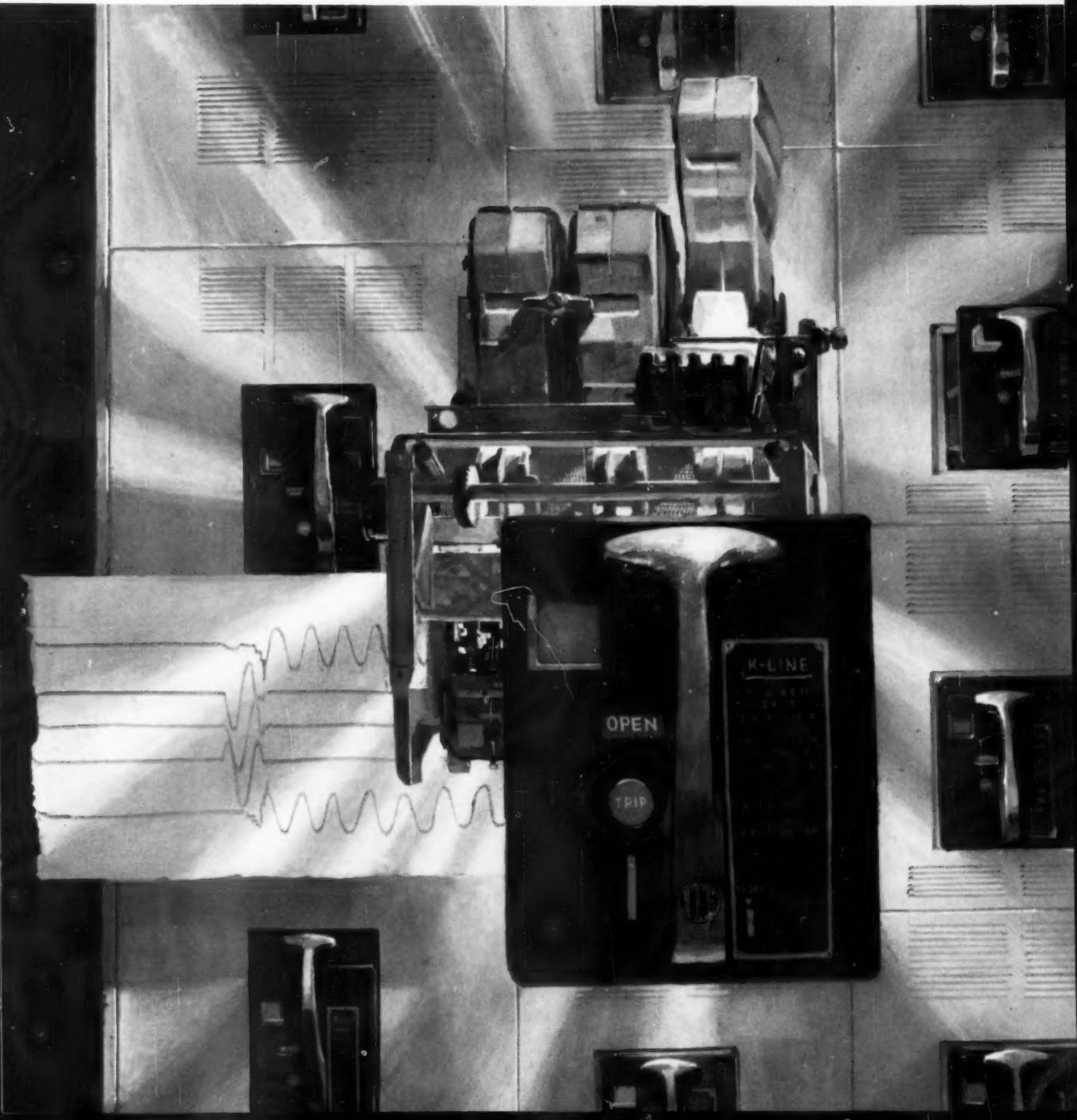
...the fastest growing name in sight!

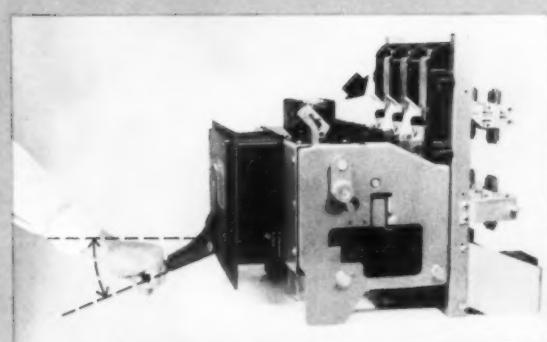
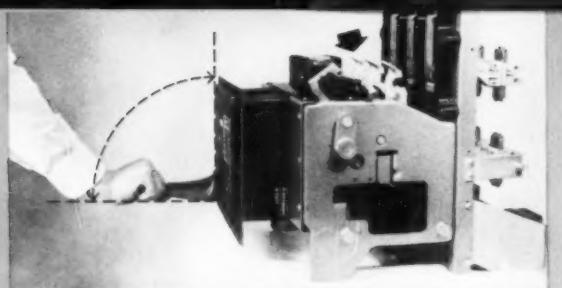


LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

I-T-E

new K-Line of low voltage switchgear represents the first major advance in this type of equipment in 13 years. This completely new design offers greatly increased safety and operating efficiency, is available in three frame size ratings: 225, 600 and 1600 amp continuous at 600 v alternating current.





Quick-make closure of contacts on manually operated circuit breakers is provided by spring action. The first 90% of the pulldown handle travel loads the springs, the last 10% releases the stored energy and closes the contacts. No teasing is possible.

I-T-E announces sweeping design advances in new line of low voltage power circuit breakers and switchgear

- First quick-make closure of contacts
- First closed-door racking of circuit breakers to any position
- First expanded range overcurrent trip device
- 4-high stacking of 600 amp frame size circuit breakers
- Subassembly construction of circuit breakers & accessories

Quick-make manual closure eliminates damaging arcing, greatly increases life of contacts and circuit breaker—contacts cannot be teased together, breaker cannot be destroyed by careless closing against a major fault.

Quick-make closure, formerly available only on electrically operated circuit breakers, now is a standard feature of all

manually operated breakers in the new I-T-E K-Line.

A manually charged stored energy mechanism, powerful enough to close the contacts safely against a full short circuit, provides the manual quick-make action. The first 90% of travel of the new pulldown handle charges a set of springs, the last 10% of travel releases the stored energy and closes the contacts—breaker life and operator safety do not depend on the brawn and brain of the operator. Contacts cannot be teased together, the closing action is fast and positive.

Electrically operated models in the K-Line have an actuating motor in addition to the basic mechanism. This motor-driven, stored energy system requires only 10 amp from a simple power source, compared to as much as 160 amp by comparable solenoid mechanisms. Energy for closing is prestored by the new K-Line circuit breakers in 2 seconds. Closing time is 5 cycles.

Closed-door drawout keeps circuit breakers clean and aisles uncluttered, promotes operator safety

This exclusive I-T-E feature permits racking of breaker into connected, test and disconnected positions without opening the door of the breaker compartment. It facilitates inspection, testing and maintenance. Blocked circuits are easy to identify. It keeps circuit breakers clean even in dust and dirt-laden atmospheres. It keeps aisles uncluttered and clear of compartment doors. It promotes personnel safety.

A lift shutter, which permits insertion of the racking crank that moves the breaker, can be padlocked in connected, test or disconnected position to guarantee complete safety. This shutter cannot be lifted while the circuit breaker is

closed. Interlocking also prevents closing of the breaker while the shutter is lifted.

The extendible escutcheon slides through the compartment door while a dust seal surrounding the escutcheon is held in place by the door.

In addition to affording closed-door drawout, the new K-Line of switchgear is smaller than any comparable design. The reduced size of the circuit breakers permits 4-high stacking of 600 amp breakers. And unitized construction reduces the switchgear to three basic components —the breaker, the enclosure, and a cradle on which the circuit breaker rolls for drawout.



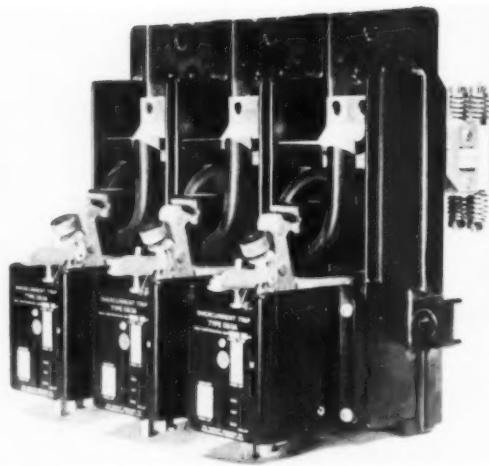
Exclusive closed-door drawout is illustrated in this series of photographs. Photo 1 shows shutter lifted and racking crank inserted. Photo 2 shows circuit breaker in connected position. Photo 3 shows breaker in test position. Photo 4 shows breaker in disconnected position.



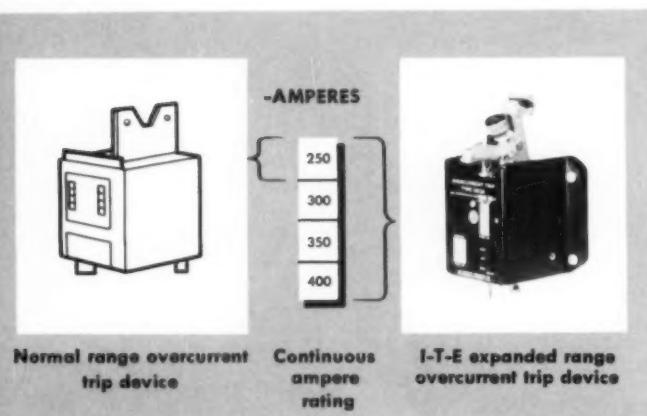
New overcurrent trip arrangement permits use of each trip over wider range of continuous load conditions



Accessible trips, on both manual and electrical types, provide new ease of adjustment. Adjustment, a difficult job at best on previous electrical types, can now be made in a matter of seconds.



Common molding holds all three trips for this 600 amp K-Line circuit breaker. Can be replaced in a fraction of time required for changing the individual trips on comparable lines.



Normal range overcurrent trip device Continuous ampere rating

I-T-E expanded range overcurrent trip device

This table indicates a sample grouping of ratings for the new K-Line circuit breakers. Only 9 trip units now cover the range of continuous current ratings as against 23 formerly required.

Trip flexibility is an important feature of the K-Line. Only 9 trip units now cover the complete range of continuous current ratings—15 to 1600 amp—as against 23 formerly required. Last-minute changes in load capacity can be satisfied in many instances with the existing trip unit as a result of the expanded range of trip settings.

This feature, plus easy adjustment of trip devices and quick change in the field, is particularly significant in meeting constantly expanding load requirements. Trip units are mounted on a one-piece base. Trip units are changed from the rear and in a fraction of the time formerly required.

For the complete story of the I-T-E K-Line of circuit breakers and switchgear, see your local I-T-E representative. Or write us for Bulletin 6004C. I-T-E CIRCUIT BREAKER COMPANY, Switchgear Division, 19th & Hamilton Sts., Philadelphia 30, Pa.



I-T-E CIRCUIT BREAKER COMPANY

19TH AND HAMILTON STREETS, PHILADELPHIA 30, PENNSYLVANIA

Do the entire job with either Polyken tape



Polyethylene

CHEAPER • NEATER SPLICE
CONFORMABLE • LESS BULKY
HIGH DIELECTRIC STRENGTH
WATERPROOF

or Vinyl

(Both available in
individual plastic containers,
job pack or bulk)

Only Polyken offers you a choice of these two plastic electrical tapes. They both give you the advantages of modern one-step primary insulation.

Polyken® ELECTRICAL TAPES

THE KENDALL COMPANY
Polyken Sales Division

SEND FOR FREE SAMPLES!

Polyken, Dept. EC-A
309 W. Jackson Blvd., Chicago 6, Illinois
Please send me free sample strips and further information on Polyken Electrical Tapes for one-step primary insulation.

Name _____ Title _____

Company _____

Street Address _____

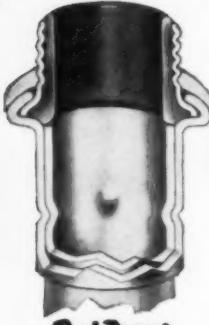
City _____ Zone _____ State _____

B-M

*the original
concrete-tight
INDENTER
FITTINGS
for E.M.T.*



**Red Throat
Insulated
Connector**



**Red Throat
Cross section**



"BM" # 100
Cutter for $\frac{1}{2}$, $\frac{3}{4}$
and 1" E.M.T.



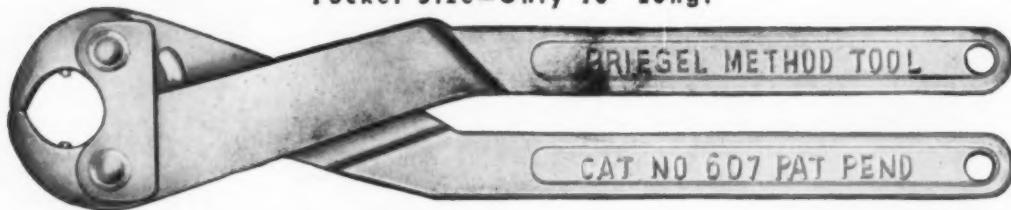
"BM" # 1000
Holder for $\frac{1}{2}$, $\frac{3}{4}$
and 1" E.M.T.



"BM" # 600
Changeable Jaw Indenter

THE NEW BM607 INDENTER FOR $\frac{1}{2}$ " FITTINGS

Pocket Size—Only 10" Long!



**Briegel Representatives
from Coast to Coast**

J. H. Akerman
813 Sistina Avenue
Coral Gables 46, Florida
Phone: Mohawk 7-3864

Harry C. Andrews Co.
3440 Gravois Avenue
St. Louis 16, Missouri
Phone: Hudson 1-7373

Crescent Electric Sales Co.
1800 N. Humboldt Blvd.
Chicago 47, Illinois
Phone: Albany 2-2600

R. L. Cunningham Electric Co.
843 South Front Street
Philadelphia 47, Pennsylvania
Phone: Dewey 4-6800

L. J. Crews
1725 Arlington Road
Richmond 20, Virginia
Phone: 4-2273

Curtis Sales Corporation
3231 Warrenville Center Rd.,
Shaker Heights 22, Ohio
Phone: Skyline 2-0225

Herbert L. Jones
745 Ohio River Blvd.
Pittsburgh 2, Pennsylvania
Phone: Linden 1-6684

Al Levin & Associates, Inc.
1200 So. Peters Street
New Orleans, Louisiana
Phone: Tulane 8480 & 8489

H. A. Maggiore & Son
15 Carlton Street
Cambridge 42, Mass.
Phone: Kirkland 7-4954

Ernst F. Hauch Co.
1282 Folsom Street
San Francisco 3, California
Phone: Hemlock 1-1828

R. C. Handy Sales Co.
4811 Excelsior Blvd.
Minneapolis, Minnesota
Phone: WAlnut 6-2939

L. D. Head Sales
1133 West 8th Avenue
Denver, Colorado
Phone: Asma 2-8003

A. Lee Clifford
1801 West 18th
Indianapolis 7, Indiana
Phone: Meirose 6-4449

Walter S. Nash
2101 Tulia Street, N.W.
Atlanta, Georgia
Phone: Elgin 8071

Burkin Electrical Sales Co.
935 Stanford Avenue
Los Angeles 21, California
Phone: Tucker 1224 & 5

Velkus-Kissel
1711 Kelly Street
Dallas 1, Texas
Phone: Hamilton 8-7388

W. W. Wheat & Son
2219 4th Avenue
Seattle 1, Washington
Phone: Seneca 6222

Arnold J. Young Co.
12600 Hamilton Avenue
Highland Park 3, Michigan
Phone: Townsend 9-5080 & 1

E. J. Martin Company
150 Nassau Street
New York 38, New York
Phone: Worth 4-6270

All B-M Indenter Fittings are U.L.
Approved as concrete-tight and
all Compression Fittings as rain-
tight as well as for general use
(File Card E10863). Also comply
With Federal Specifications
W-F-406.





fill in the **NAME**
and win a *free* sample



HUBBELL'S NEWEST PRODUCT
SOON TO BE ANNOUNCED

Easy as A.B.C.—just fill in the yellow spaces to spell out the name we've picked for our newest product and you'll win a sample, free. Do it now! . . . but be sure to follow these rules:

1. Eligibility: contest open to Hubbell distributors, electrical contractors, electricians, architects or electrical consulting engineers.
2. Only one sample to a firm.
3. All entries must be postmarked no later than midnight, Feb. 14, 1958.
4. Coupon below must be filled out in full and mailed along with a copy of your Company letterhead to:

HARVEY HUBBELL, INC.
BOX 3052, BRIDGEPORT 5, CONN.

NAME _____

COMPANY
NAME _____

COMPANY
ADDRESS _____

CITY _____

STATE _____

C _____



THE RIGHT DI

in design of utility systems is a composite of all that is proven and reliable in the individual components. A close inspection will reveal that generators, transformers, motors, meters, switchgear and controls—so necessary for power generation, transmission and distribution—all utilize AMP for connection and termination on the original equipment you purchase. For added reliability on your own equipment you can demand no less.

Standardize on AMP for generating and sub-station construction and maintenance, communication, panel and switchgear wiring, street and traffic lighting, appliance and meter repair and all other applications where terminals and connectors must produce improved quality, cost reduction and reliable service.

A-MP terminals, when required for maintenance and repair needs, are available in the U.S.A. through American Pamcor Inc.

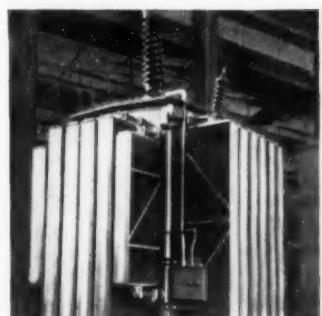
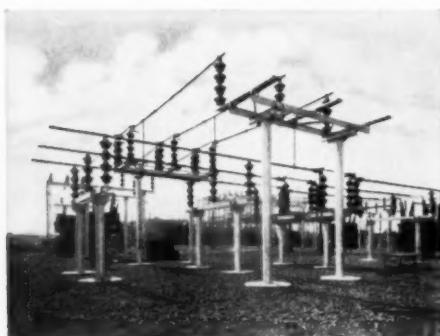
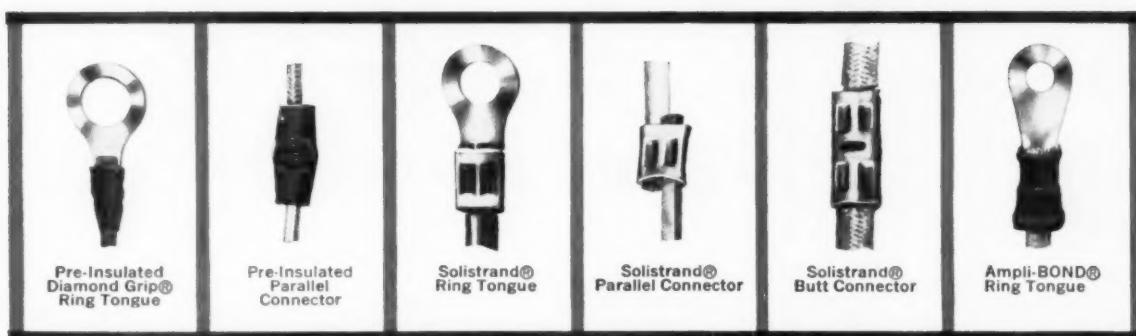
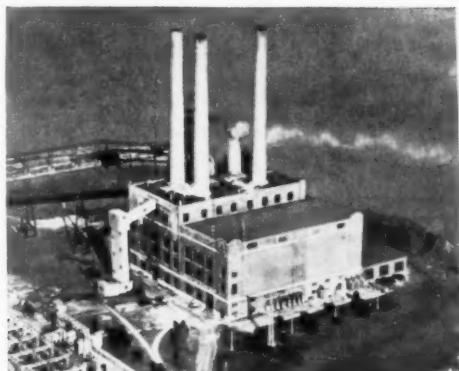
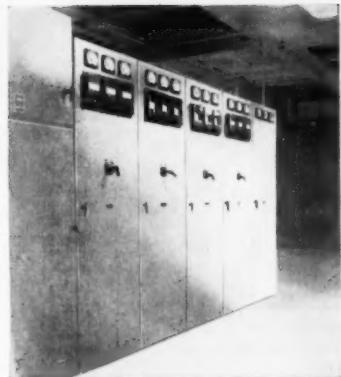
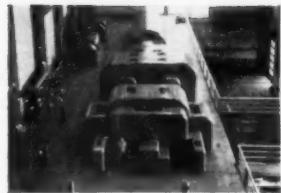


AMP INCORPORATED

GENERAL OFFICES: 7341 EISENHOWER BOULEVARD, HARRISBURG, PA.

Wholly Owned Subsidiaries: Aircraft-Marine Products of Canada Ltd., Toronto, Canada • Aircraft-Marine Products (Great Britain) Ltd., London, England • Societe AMP de France, Le Pre St. Gervais, Seine France • AMP—Holland N.V. 's-Hertogenbosch, Holland • *Distributor in Japan:* Oriental Terminal Products Co., Ltd., Tokyo, Japan

RECTION



AMP®

(Advertisement)

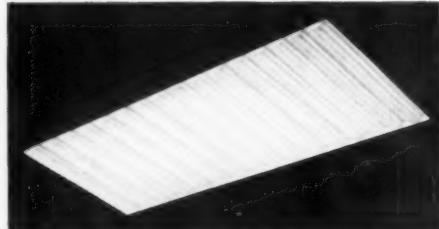
THESE AUTHORIZED DISTRIBUTORS CAN
HELP YOU SOLVE YOUR LIGHTING PROBLEMS

ALABAMA
Birmingham: Electra Sup. Co.
CALIFORNIA
San Francisco: Superior Elec.
California Elec. Sup. Co.
COLORADO
Denver: Central Elec. Sup.
CONNECTICUT
Bridgeport: B. M. Tower
Hartford: Beacon Light & Sup. Co.
New Haven: Grand Light & Sup. Co.
New London: United Elec. Sup. Co.
FLORIDA
Miami: Farrey's Whse. Hdwe. Co.
GEORGIA
Atlanta: Atlanta Litg. Fix.
ILLINOIS
Chicago: Efengee Elec. Sup. Co.
Englewood Elec. Sup. Co.
Hawkins Electric
Hyland Elec. Sup. Co.
Elgin: Fox Elec. Sup.
Rockford: Englewood Elec. Sup. Co.
Springfield: Springfield Elec. Sup.
INDIANA
Pt. Wayne: Mossman-Yarnelle Co.
Gary: Englewood Elec. Sup. Co.
So. Bend: Englewood Elec. Sup. Co.
IOWA
Des Moines: Weston Lighting Co.
KANSAS
Kansas City: W. T. Foley Elec. Co.
KENTUCKY
Paducah: Ohio Valley Sup.
LOUISIANA
Baton Rouge: Electrical Wholesalers
New Orleans: Interstate Elec. Co.
MAINE
Bangor: Standard Elec. Co.
MARYLAND
Baltimore: Atlantic Illuminating Co.
MASSACHUSETTS
Boston: Mass. Gas & Elec. Light Co.
Henry L. Wolfers Inc.
Fitchburg: Service Elec. Sup. Co.
Pittsfield: Carr Supply
Springfield: Eastern Elec. Sup.
Worcester: Atlantic Elec. Sup.
Benjamin Elec. Sup.
MICHIGAN
Detroit: Michigan Chandelier Co.
Madison Elec. Co.
Flint: Royalite Co.
Grand Rapids: Purchase Elec. Sup. Co.
Pontiac: Standard Elec. Co.
Saginaw: Standard Elec.
MINNESOTA
Duluth: Northern Elec. Sup. Co.
Minneapolis: Charles A. Anderson & Co.
Northland Elec. Sup. Co.
St. Paul: Lax Elec. Co.
MISSOURI
St. Louis: M. K. Clark
NEBRASKA
Omaha: Electric Fix. & Sup. Co.
NEVADA
Reno: Western Elec. Dists. Co.
NEW HAMPSHIRE
Portsmouth: Mass. Gas & Elec. Light Co.
NEW JERSEY
Atlantic City: Franklin Elec. Sup. Co.
Camden: Camden Elec. Fix. Co.
NEW YORK
Albany: Havens Elec. Co., Inc.
Binghamton: Trele Elec. Sup. Co.
Buffalo: Buffalo Incan. Light Co. Inc.
Niagara Falls: Hysen Sup. Co.
Poughkeepsie: Electra Sup. Co.
Rochester: Rowe Electric Sup. Co.
SYRACUSE: Superior Elec.
NORTH CAROLINA
Charlotte: Independent Elec. Sup.
Durham: Noland Co.
Greensboro: Elec. Sup. & Equip. Co.
Kinston: Kinston Elec.
Winston-Salem: Noland Co.
OHIO
Akron: The Sacks Elec. Sup. Co.
Canton: The Electric Sales
Cincinnati: B. & B. Elec.
Cleveland: H. Leff Electric
Columbus: Elgee Elec. Co.
The Loeb Elec. Co.
Dayton: Martin Elec. Co.
Toledo: Gross Elec.
YOUNGSTOWN:
Mass Industries
OKLAHOMA
Tulsa: Lawson Elec. Co.
PENNSYLVANIA
Allentown: Coleman Elec. Co.
Erie: Kraus Elec. Co.
Harrisburg: Fluorescent Sup. Co.
Harrisburg: Power Elec. Co. Inc.
New Castle: Midwestern Elec. Co.
Philadelphia: Ace Lighting Fix. Co.
Gold Seal Elec. Sup. Co.
Sylvan Elec. Fix. Co.
PITTSBURGH:
Allied Elec. Sup. Co.
Argo-Lite Studios
Doubleday-Hill Elec. Co.
Wally Elec. Sup. Co.
Reading: Coleman Elec. Co.
Scranton: Lewis & Reif
Wilkes-Barre: Anthracite Elec. Sup. Co.
RHODE ISLAND
Providence: Major Elec. Sup. Co.
Leavitt Colson Co.
SOUTH CAROLINA
Anderson: Sullivan Hdwe. Co.
Columbia: Capitol Elec. Sup. Co.
Noland Co.
Greenville: Sullivan Hdwe. Co.
SOUTH DAKOTA
Watertown: J. H. Larson Elec. Co.
TENNESSEE
Johnson City: Noland Co.
Nashville: Nashville Elec. Sup. Co.
TEXAS
Dallas: Rogers Elec. Sup.
Fr. Worth: Anderson Fixture Co.
Houston: Morris Associates
San Antonio: Southern Equip. Co.
VIRGINIA
Arlington: Rosslyn: Noland Co.
Lynchburg: Mid State Elec. Sup. Inc.
Norfolk: Noland Co.
Roanoke: Noland Co.
WEST VIRGINIA
Charleston: Goldfarb Elec. Sup. Co.
Charleston: Virginia Electric Inc.
Huntington: West Virginia Elec. Co.
Wheeling: The Front Co.
WISCONSIN
Appleton: Moe Bros. Northern Co.
Eau Claire: W. H. Hobbs Sup. Co.
Milwaukee: Lappin Elec. Co.
Standard Elec. Sup.
WASHINGTON
Seattle: Seattle Lighting Fix. Co.
ALASKA-Anchorage: Northern Supply Co.
CANADA
Montreal: The Gray Elec. Co.
Toronto: Revere Elec. Dist.
McDonald & Wilson Co.
Toronto: Elec. Sup. Co.
HAWAII
Honolulu: Hawaiian Light. & Sup. Co.
PUERTO RICO
San Juan: Antillas Elec. Corp.



WHO'S ON THE LADDER WITH SMITTY?

The man who's almost there is the Lightolier engineer who planned the time-saving installation features of every Lightolier. Take our new fluorescent Strialux fixture. It has detachable grab handles, flexible sides, started screws, snap-toggle yokes... a host of cost-cutting features. And, it fits quickly and easily into all the new 2'x4' modular ceilings and into plaster construction. You'll get more satisfied customers, too, because of its glare-free light, easy maintenance. For the whole story, check the authorized Lightolier distributors listed left. By the way, their men are ready to go out on calls with you, help you get more profitable orders. See them now or write us at Dept. EC-18.



THE ARCHITECTURAL LIGHTING DIVISION

LIGHTOLIER

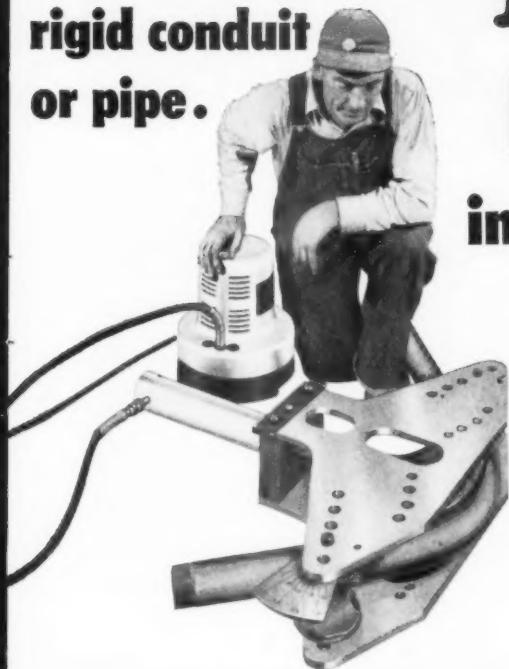
ARCHITECTURAL LIGHTING • RESIDENTIAL FIXTURES • PORTABLE LAMPS

MAIN OFFICE AND FACTORY: Jersey City 5, New Jersey SHOWROOMS: New York, Chicago, Los Angeles

**For thin-wall or
rigid conduit
or pipe.**

BLACKHAWK PIPE BENDERS

in every size and price range!



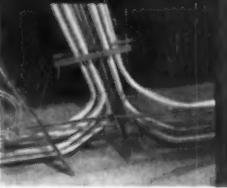
MODEL	PUMP	DIAMETERS
S-30A	Hyd. hand pump	1, 1½, 1¾, and 2" rigid conduit and pipe
S-34	Hyd. hand pump	1½, 1¾, 2" thin-wall conduit
S-36	Hyd. hand pump	1½, 1¾, 2, 2½, 3, 3½; 4" rigid conduit and pipe
New S-130 1-bite	Hyd. hand pump	½ - 2" rigid conduit and pipe
New S-132 1-bite	Electric-powered pump	½ - 2" rigid conduit and pipe
New S-137	Hyd. hand pump	1½, 1¾, 2, 2½, 3, 3½, 4" rigid conduit and pipe
New S-138 1-bite	Hyd. hand pump	1½, 1¾, 2, 2½, 3" rigid conduit and pipe
New S-139 1-bite	Electric-powered pump	1½, 1¾, 2, 2½, 3" rigid conduit and pipe
New S-140	Electric-powered pump	1½, 1¾, 2, 2½, 3, 3½, 4" rigid conduit and pipe



EXCLUSIVE "OPTIK-ANGLE" GAUGE. A magical time and work saver! Gauge is mounted right on bending shoe to give exact degree of bend during bending operation. Gone are guess-work, time-wasting measurements for determining correct degree of bends!



ALUMINUM REMOVABLE TOP PLATE. "Lock-on" shoes — no threading of shoes on ram — simply place them in position and insert lock pin. Pipe is quickly positioned from above rather than "musclled" in from side. Top-plate has snap action, quick-lock bolt.



WHOPPING 77% SAVED ON BENDS! Dietz Electric Co., project foreman says, "Last job, we saved more than \$2,000 compared to manufactured ells. From now on, Blackhawk S-139 is our production bender." Try Blackhawk . . . the fastest bender on the market today.

BLACKHAWK bends prove BLACKHAWK'S best!

B **BLACKHAWK**

BLACKHAWK MFG. CO., MILWAUKEE 46, WIS.

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . JANUARY, 1958

You look ahead to amazing savings when you look over the world's most complete line of pipe benders . . . yours from Blackhawk. First choice with electricians everywhere! Exclusive advanced designs do the hard work for you . . . pay for themselves in 2 or 3 jobs! Be prepared to save up to 77% over cost of manufactured ells.

New super-portable featherweight aluminum models are easiest to set-up! Make bends in 3" pipe in just one bite! Turn out neater, more accurate jobs in half of the time required by ordinary benders.

Check this chart now. Then select the Blackhawk that is just right for you.

One bite does it! NEW Blackhawk aluminum benders slash costs 77%!



NEW S-130 FEATHERWEIGHT ALUMINUM BENDER for ½ to 2" pipe and rigid conduit—make full 90° bends in just one operation! Speeds making 180° bends, double offsets and compound bends. Cuts bending time in half! See for yourself! Try one on your next job.



NEW S-140 FEATHERWEIGHT ALUMINUM BENDER for up to 4" pipe — Electric power operated. A cinch for one man to assemble and carry right to the job! Bends up to 3" rigid conduit in one lightning pass! Only 3 quick setups are needed for 3½ and 4" 90° pipe bends.

**SEE YOUR
DISTRIBUTOR
... TODAY!**

. . . choose from his
complete Blackhawk stock!

Safest Stud Driver



Here's all you do: Simply screw a threaded stud (A) into piston (B), insert in barrel of Stud Driver, insert Power Load, close the tool and . . .



it's ready to fire! Press the Stud Driver guard firmly against work surface and squeeze the tool's trigger. A 45° turn aligns buffer assembly . . .



with piston . . . and the Stud Driver is easily removed from work. The stud — with piston still attached — is permanently anchored. Next,



Fastening in improper materials: Piston with stud is inserted into barrel of the Stud Driver, Power Load is inserted, tool is closed. Then . . .



operator inadvertently fires the "Safety-Zoned" Stud Driver into a thin work surface, as shown in the photograph. Piston is . . .



stopped short at end of tool, preventing free flight of the stud. That's because the stud and piston are both locked to tool during firing.



Exclusive Remington "Safety-Zoned" Guard Assembly is designed to prevent free flight of studs

New concept in safety is offered by the Remington Model 455A Stud Driver with Captive Stud Guard Assembly. Heart of the exclusive Remington Guard Assembly is a combination of captive piston and aluminum alloy buffer. Square-headed piston is abruptly halted by buffer when base material is inadequate to stop the stud. You can count

on the Stud Driver to do your construction fastening jobs quickly, effectively and safely!

If you already own a Remington Stud Driver, ask your distributor about the new Captive Stud Guard Assembly. If you're planning to buy a tool, remember: If it's the Remington Captive Stud tool, it's the safest Stud Driver on the market!

On the Square . . .  *... It's the Safest!*

Ever Designed!



unscrew piston from threaded stud, screw another $\frac{1}{4}$ " diameter Remington Stud into piston . . . and you're ready for the next shot!



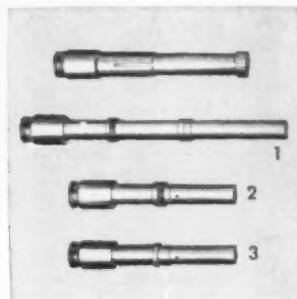
Next step: Piston with stud and deformed aluminum buffer are removed from tool. New buffer is inserted, and tool is ready for use!

Remington Stud Driver with New Captive Stud Guard Assembly

HERE's the most advanced construction fastening tool ever developed—the Remington Stud Driver with *new* Captive Stud Guard Assembly! The Remington Stud Driver offers you power, speed and efficiency—yet it's designed to prevent free flight of studs through a working surface. That means additional protection in crowded areas, permits use of the Stud Driver in a whole new range of situations.

Just a squeeze of the trigger is all it takes to anchor wood or metal to concrete or steel with $\frac{1}{4}$ " diameter alloy steel Remington Studs. There's a wide selection of studs to choose from, plus scientifically graded Power Loads that furnish the *exact* driving force you need. No outside power connections are required—pre-drilling is entirely eliminated!

Now...in addition to barrel for Captive Stud Guard Assembly, 3 interchangeable standard barrels give greater-than-ever versatility



Remington Stud Driver owners have three other barrels to choose from in addition to special barrel for Captive Stud Assembly: (1) heavy-duty $\frac{3}{8}$ " long barrel to handle toughest construction jobs; (2) $\frac{3}{8}$ " short barrel for medium-duty work; and (3) a $\frac{1}{4}$ " standard barrel for light fastening. And there are more than 15 instantly attachable Remington Guards to adapt the Stud Driver for every fastening requirement!



MAIL COUPON TODAY FOR VALUABLE FREE BOOKLETS!

Industrial Sales Division
Remington Arms Company, Inc.
Bridgeport 2, Connecticut

ECA

Please send me full information about the new Remington Stud Driver and Captive Stud Guard Assembly.

Name _____

Firm _____ Position _____

Address _____

City _____ State _____

Remington
DU PONT
STUD DRIVER

Remington Arms Company, Inc.,
Bridgeport 2, Connecticut



Time-saving convenience. No waiting for short lengths to be cut off reels. Buy only what you need to finish up the job.



Quick, easy handling. You don't need a truck to pick up the wire you need. Just throw one of these cartons in the front seat of your car.



All-round protection. No matter where you use short lengths on the job, these convenient Rome cartons will protect your wire up to the minute it is strung.

Need short lengths of bare or weatherproof wire to finish up a job?

Pick them up in these handy Rome cartons

For your convenience, Rome bare and weatherproof wire, Triplex and Duplex SS cable—in short lengths—are packaged in handy cartons.

Don't lug a full reel onto the job when all you need is a short length to finish up the installation. Just ask your Rome distributor for the size you need in one of Rome's easy-to-handle cartons.

140

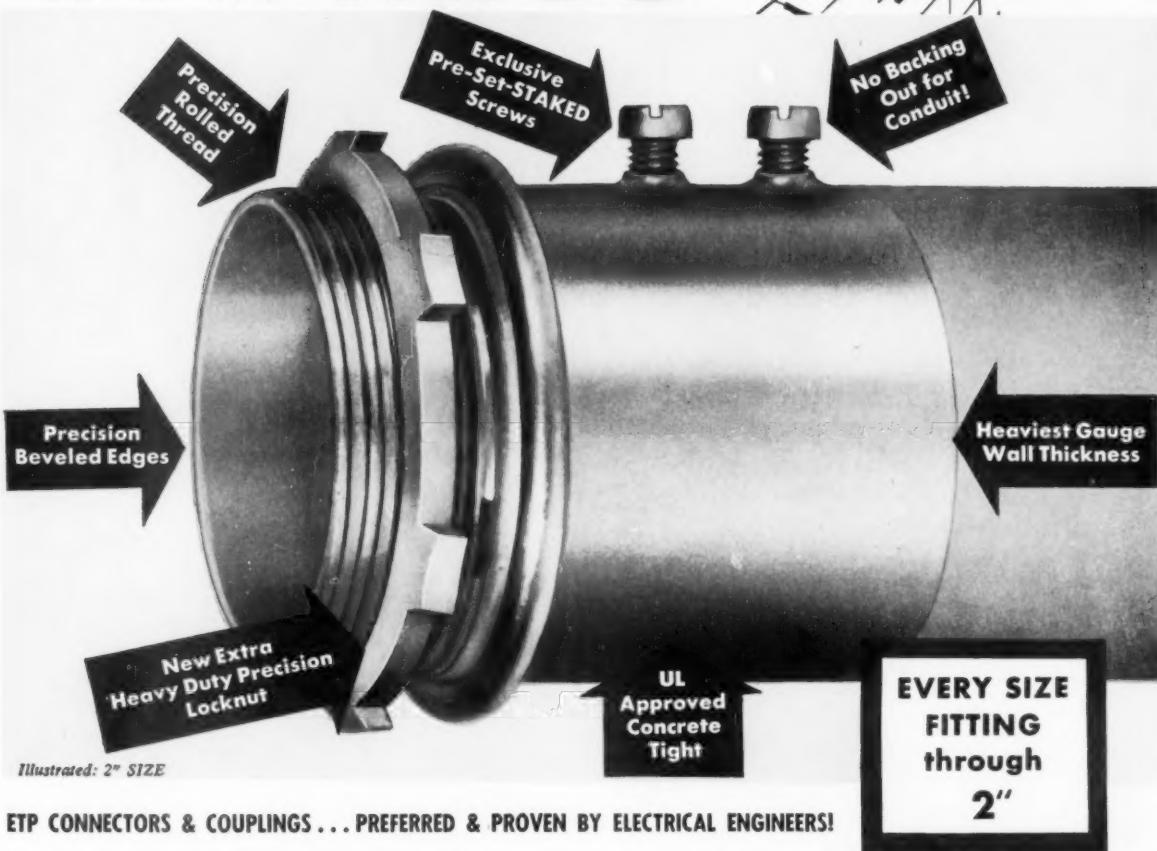
Type	Size	No. of Strands	Conductor	Covering	Length	Package	Packaging	Approx. Wgt. Lbs.
Bare	14	Solid	Copper	None	1000'	Spool	1 per carton	13
Bare	12	Solid	Copper	None	1000'	Spool	1 per carton	20
Bare	10	Solid	Copper	None	500'	Spool	1 per carton	16
Bare	8	Solid	Copper	None	500'	Spool	4 per carton	105
Bare	8	7	Copper	None	500'	Spool	4 per carton	105
Bare	6	Solid	Copper	None	300'	Spool	4 per carton	105
Bare	6	7	Copper	None	300'	Spool	4 per carton	105
Bare	4	Solid	Copper	None	200'	Spool	4 per carton	105
Bare	4	7	Copper	None	200'	Spool	4 per carton	105
Bare	2	7	Copper	None	250'	Coil	1 per carton	51
Weatherproof	14	Solid	Copper	Roprene	500'	Coil	1 per carton	10
Weatherproof	12	Solid	Copper	Roprene	500'	Coil	1 per carton	14
Weatherproof	10	Solid	Copper	Roprene	500'	Coil	1 per carton	20
Weatherproof	8	Solid	Copper	Roprene	500'	Coil	1 per carton	34
Weatherproof	6	Solid	Copper	Roprene	500'	Coil	1 per carton	51
Weatherproof	14	Solid	Copper	TK	500'	Coil	1 per carton	13
Weatherproof	12	Solid	Copper	TK	500'	Coil	1 per carton	17
Weatherproof	10	Solid	Copper	TK	500'	Coil	1 per carton	27
Weatherproof	8	Solid	Copper	TK	500'	Coil	1 per carton	36
Weatherproof	6	Solid	Copper	TK	500'	Coil	1 per carton	54
Triplex SS	6	Solid	Aluminum or ACSR	Roprene or Rolene	500'	Coil	1 per carton	80
Triplex SS	6	7	"	"	500'	Coil	1 per carton	80
Triplex SS	4	Solid	"	"	500'	Coil	1 per carton	110
Triplex SS	4	7	"	"	500'	Coil	1 per carton	110
Duplex SS	6	7	"	"	500'	Coil	1 per carton	50
Duplex SS	4	7	"	"	500'	Coil	1 per carton	75

- Save this ad and use it as a handy buying guide for Rome wire and cable in short lengths.

ROME CABLE
CORPORATION

EXPERIENCED HANDS KNOW...

THERE IS A DIFFERENCE *in* FITTINGS



ETP CONNECTORS & COUPLINGS . . . PREFERRED & PROVEN BY ELECTRICAL ENGINEERS!

- Concrete tight! Far surpasses U.L. requirements.
U.L. File Card E24788.
- One piece solid tubular steel — cannot open or spread. Sized for uniformity.
- Precision rolled thread for 54% greater strip-
- ping strength — 66% greater snapping strength.
- Lustrous zinc, heavy plated finish.
- Available in $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ " (one screw type) and new $1\frac{1}{2}$ " & 2" sizes (two screw type).

CONNECT WITH **ETP** FOR ECONOMY

WRITE FOR FREE
SAMPLES & BROCHURE

ETP



ELECTRIC TUBE PRODUCTS 74-16 Grand Avenue, Maspeth (N.Y.C.), N.Y. • DEFender 5-8000



Sand... heavy rain... extreme heat...

Nothing stops These Westinghouse

Life-Line A Motors

*dependably driving oil well pumps in Odessa, Texas
district of The Atlantic Refining Company,
24 hours per day, 7 days a week!*

"Here's an application," says A. P. Johnston, production engineer at The Atlantic Refining Company, "where we must have continuous motor operation . . . sometimes for as long as 18 months . . . with virtually no maintenance or repair. Many of our pumping stations are remotely located, automatic and unmanned. Any stoppage or motor failure would result in the loss of several hundred barrels of oil. Motor repairs in the field are prohibitive in cost. We must have *complete* motor reliability and that's

exactly what we get from our Westinghouse Life-Line® "A" motors."

How about you? Got a really tough motor application which you can't afford to pamper? Then ask your Westinghouse sales engineer to show you how the dependable Life-Line "A" pays for itself through reduced maintenance and repair. Or write to Westinghouse Electric Corp., P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J-22055

YOU CAN BE SURE...IF IT'S

Westinghouse



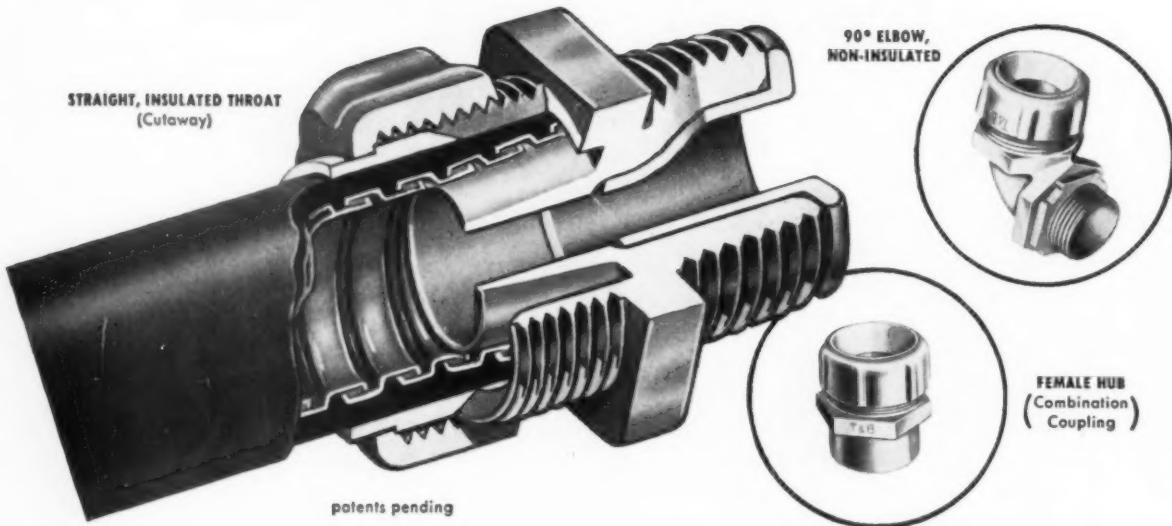
On this pumping unit, the 15-hp Life-Line "A" motor operates in an atmosphere of damaging dust, sand and moisture. Despite continuous, heavy-duty service, motor has never suffered any overheating since first installed. Prelubricated bearings of the Life-Line "A" eliminate periodic greasing . . . keep lubricant in . . . dirt out.



ONLY T&B CONNECTORS

*for flexible liquid-tight conduit**

OFFER ALL THESE ADVANTAGES



THE T&B LINE provides a size range of $\frac{3}{8}$ " to 4" in the straight, 45° and 90° angle types . . . both insulated and non-insulated.

THE T&B LINE includes combination couplings from $\frac{3}{8}$ " to 1 $\frac{1}{4}$ ".

A T&B Liquid-Tight connection can't be half safe. The mechanical strength, continuity of ground, and oil seal are all interdependent. Each gives positive assurance that you have all three. And T&B's more compact design means easier installation and improved appearance.

Your T&B distributor has this complete line in stock. Be sure to ask for a demonstration . . . or write direct to T&B for detailed specifications.

* Sealite or equivalent

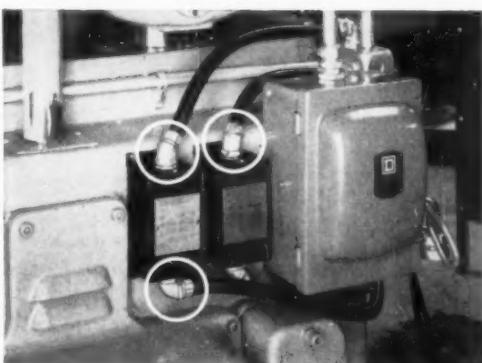
LOOK FOR THIS SIGN —



The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs.

THE T&B INSULATED LINE complies with all codes:

The National Electric Code (Paragraph 3736b)
J.I.C. Standards (Paragraphs 22.1.7 and 22.2.2)
Machine Tool Electrical Standards (Paragraph 22.1.7)



IT'S THE MARK OF AN AUTHORIZED T & B DISTRIBUTOR

**THE THOMAS & BETTS CO.
INCORPORATED**

34 BUTLER STREET, ELIZABETH 1, NEW JERSEY
THOMAS & BETTS, LTD., MONTREAL, P. Q., CANADA
MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898

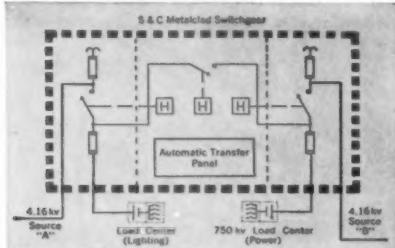


FOR INDUSTRIAL HIGH-VOLTAGE POWER CIRCUITS —

**buy the right protection
in your switchgear—buy
S&C Metalclad Switchgear—Save 50 %**

Industrial circuits do not have transient faults. They cannot be re-energized immediately after an outage.

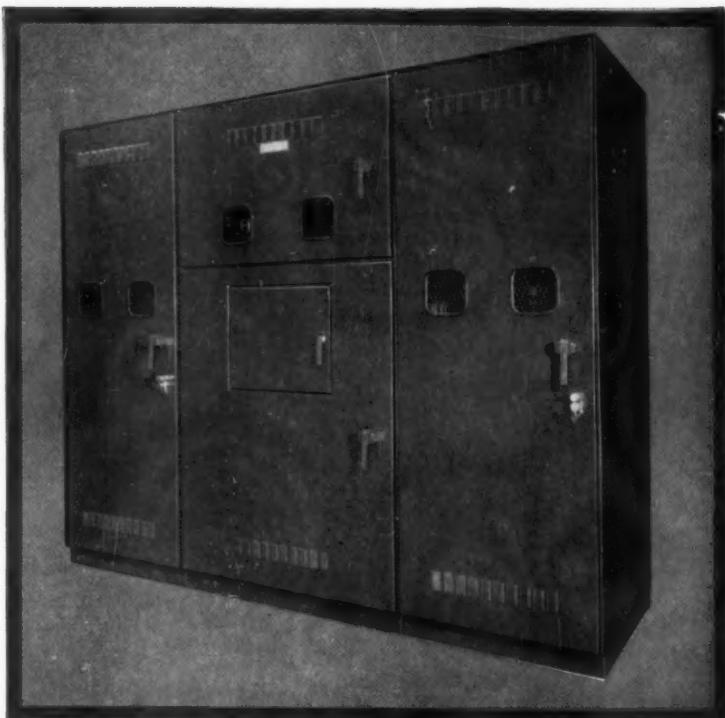
Hence costly circuit breakers are unnecessary. S&C Power Fuses give the right protection.



Source A normally supplies the Lighting Load, and Source B normally supplies the Power Load. In case of power failure of either source, the S&C Standard Automatic Transfer Panel (located in the center bay) goes into action. It causes the S&C Moto-Draulic Operators [H] to actuate the "source" and "tie" load interrupters transferring both loads to the live source, insuring service continuity.

For industrial, commercial, and institutional high-voltage power circuits, conductors run in cables or conduits. They are not exposed to lightning, falling trees, rodents, wind, or ice which typically cause transient faults.

Consequently, the only faults that occur are permanent faults and S&C Power Fuses give the right protection against them. The quick reclosing feature of expensive circuit breakers is of no value here. S&C Metalclad Switchgear—by using S&C Power Fuses rather than circuit breakers, and by incorporating load interrupters for full load switching—



S&C Metalclad Switchgear with automatic transfer installed in the Methodist Hospital, Indianapolis, Indiana. Architect: D. A. Bahlen & Son; Consulting Electrical Engineer: Ammerman-Davis & Stout Co.; Electrical Contractor: Watson-Flagg Engineering Co. One of two such units, this switching center serves the hospital's Main and Center Wings. A similar unit serves another building.

brings substantial savings in switchgear costs—sometimes as much as 50%.

S&C Electric Company, 4433 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.



**S & C ELECTRIC
COMPANY**



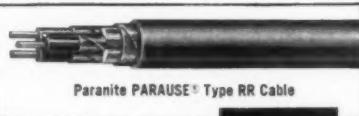
MEN RESPONSIBLE FOR
POWER DISTRIBUTION KNOW...

IF IT'S PARANITE IT'S RIGHT!®



From Power Cable to Fixture Wire...

you'll find Paranite quality high and service outstanding. That's why such well-known products as Paranite Parause®; Hydro-Therm®, a complete line of RH and RW building wires and the quality Parasyn® insulations (approved from size 14 to 2000 MCM) are used by experienced contractors throughout the land. For your next job, specify PARANITE...the wire of proven performance.



PARANITE WIRE AND CABLE
DIVISION ESSEX WIRE CORPORATION
FORT WAYNE 6, INDIANA

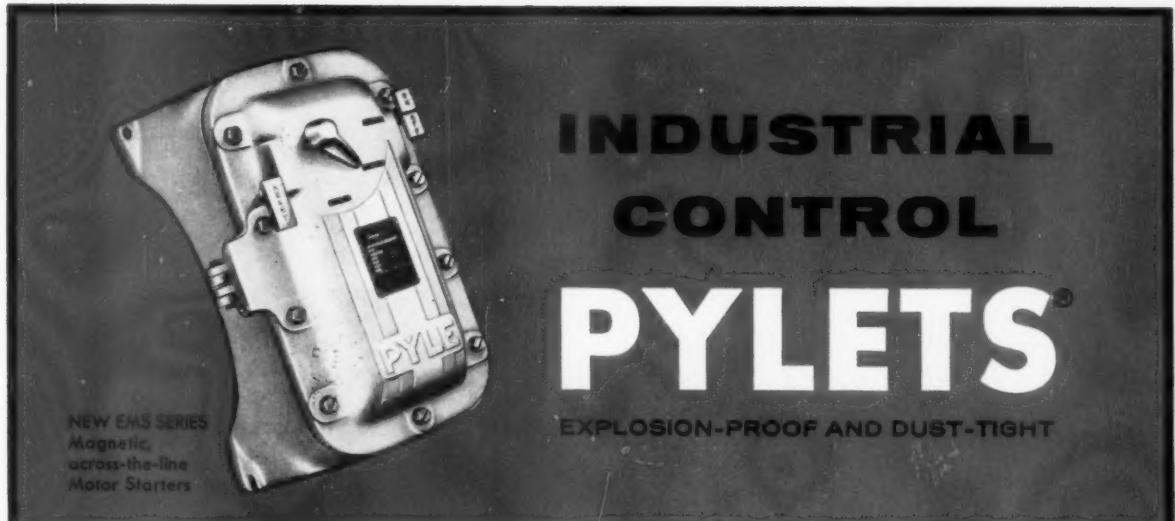
MANUFACTURING PLANTS: *Birmingham, Ala.; Anaheim, Calif.; Jonesboro, Ind.; Marion, Ind.; Tiffin, Ohio
Warehouses* and Sales Offices

*Chicago, Illinois
Cleveland, Ohio
Dallas, Texas
Detroit, Michigan

Hartford, Connecticut
Indianapolis, Indiana
*Kansas City, Missouri
Los Angeles, California

*Newark, New Jersey
Omaha, Nebraska
*Portland, Oregon
Upper Darby (Philadelphia), Pa.

Rochester, New York
*Saint Louis, Missouri
*San Francisco, California
Springfield, Illinois



FOR HAZARDOUS LOCATIONS

SECOND TO NONE FOR... SAFETY AND ECONOMY... LONG SERVICE LIFE

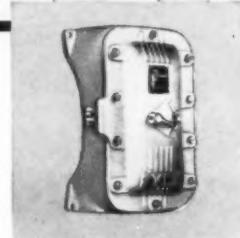
NEW

CORROSION-PROOF COVER JOINT:

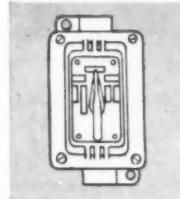
The metal to metal joints of all explosion-proof Pylets, both the ground joint types and the threaded joint types, are cadmium plated to maintain the integrity of the flame arresting path against corrosion. Only cadmium plate can provide this valuable protection on ferrous alloy castings.

The new EMS motor starters, ECM combination motor starters and ECB circuit breakers have cadmium plated, ground cover joints plus the following features:

- COMPACT RECTANGULAR SHAPE
- HINGE SUPPORTED COVER
- RAIN-TIGHT PROTECTION
- COMPLETE ACCESSIBILITY FROM FRONT
- MINIMUM BENDING OF CONDUCTORS
- TAPERED TAPPED HUBS



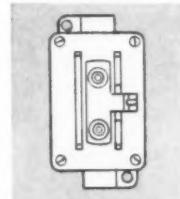
New ECB Series Circuit Breakers



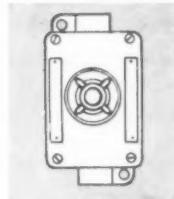
ER-SS Selector Switches



ER-M Manual Motor Starters



ERC Push Button Stations



ERP Pilot Lights

Sold Nationally Through Authorized Distributors. Write for Literature.

THE PYLE-NATIONAL COMPANY
WHERE QUALITY IS TRADITIONAL

1344 North Kostner Avenue, Chicago 51, Illinois

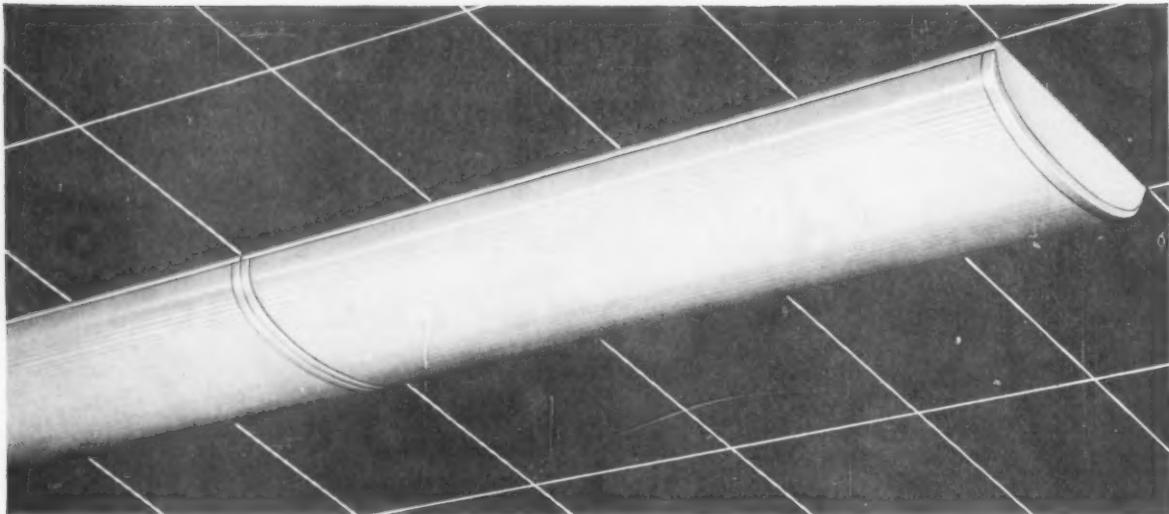
BRANCH OFFICES AND AGENTS IN PRINCIPAL CITIES OF THE U.S. AND CANADA • CANADIAN AGENT: THE HOLDEN CO., LTD.
MONTREAL • RAILROAD EXPORT DEPARTMENT: INTERNATIONAL RAILWAY SUPPLY CO., 30 CHURCH ST., NEW YORK 7, N.Y. •
INDUSTRIAL EXPORT DEPARTMENT: ROCKE INTERNATIONAL CORP., 13 E. 40TH ST., NEW YORK 16, N.Y.

CONDUIT FITTINGS • PLUGS AND RECEPTACLES • LIGHTING FIXTURES • FLOODLIGHTS



"Built-In" look...

Surface-Mounted Cost



GARCY Ultra-Lux... shallow, plastic enclosed fixture... ideal for low ceiling lighting

Minimum depth consistent with good light distribution and brightness control

With curved shield, unit is only $3\frac{1}{4}$ " at its deepest point... yet surface brightness is virtually uniform at all viewing angles and well within acceptable limits for glare-free comfort.

Improved light-stable extruded plastic guaranteed not to warp or discolor

Shield is of Koppers improved EVENGLO*, a premium-grade polystyrene with built-in resistance to discoloration caused by ultra-violet radiation of fluorescent lamps.

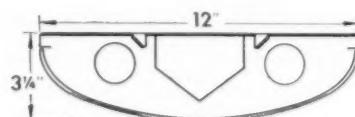
*EVENGLO is a registered trade mark of Koppers Company, Inc.

Easy to install... only two basic parts

Completely assembled chassis with integral end plates is lightweight, sturdy, easy to handle. Separately cartoned one-piece shield hooks on after installation.

Easily cleaned... no need to remove shield from fixture

Curved shield is invisibly framed and hinged... lets down at a touch, wipes clean in seconds.



Garcy offers a complete line of lighting fixtures for commercial, institutional and display lighting.

Garden City Plating and Manufacturing Company
2475 Elston Avenue • Chicago 47, Illinois
In New York City—48 West 48th Street
In Los Angeles—Garcy Western Corporation, 3912 Broadway Place
In Canada—Garcy of Canada, Ltd., 1244 Dufferin Street, Toronto

GARCY
Preferred for Performance
COMPLETE COMMERCIAL LIGHTING

Specify the finest...



PHELPS DODGE COPPER PRODUCTS CORP.

Phelps Dodge Habirite-Habiprene!

Rely on this highest quality cable— it works where others fail

The term "RR" is only a name, not an assurance of quality. Instead of ordering just "RR" cable, insist on Phelps Dodge Habirite-Habiprene—developed through years of experience in designing and making high voltage cables. Habirite-Habiprene exceeds the trade's highest standards of quality and reliability.

Phelps Dodge Habirite insulation, a specially engineered butyl rubber compound, has a service dependability record unapproached by any other type of rubber insulation. Habirite is greatly superior to old-fashioned insulations for these reasons:

- ▶ Much greater resistance to heat and oxidation. This permits a higher temperature rating, with consequent reduction in conductor size and in cable cost.
- ▶ Much greater resistance to ozone—present around high voltage equipment.
- ▶ Much greater mechanical toughness affording maxi-

mum protection against damage from tools, stones and other installation hazards.

- ▶ Better electrical properties—giving a greater safety factor in operation.
- ▶ Maximum uniformity of finished product—due to controllable uniformity of raw materials.
- ▶ Elimination of seams which cause weak spots—through use of Phelps Dodge extrusion insulating process.

Phelps Dodge Habiprene sheath, a unique neoprene compound, is especially made to be extra resistant to corona, one of the worst enemies of high voltage cable. This *extra resistance to corona* is an exclusive Phelps Dodge feature. It provides a greater safety factor in operation and has contributed to the remarkable reputation and service record of Habirite-Habiprene.

When you specify Habirite-Habiprene, you are assured of getting "RR" cable with the utmost in safety and durability. Habirite-Habiprene is the result of Phelps Dodge's rigid quality standards, long experience, expert engineering and vast facilities.

PHELPS DODGE COPPER PRODUCTS CORPORATION

SALES OFFICES: Atlanta, Birmingham, Ala., Cambridge, Mass., Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Fort Wayne, Greensboro, N. C., Houston, Jacksonville, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N. Y., San Francisco, St. Louis, Seattle, Washington, D. C.

SPECIFY QUALITY . .

INSIST ON MCGILL® PORTABLE LAMP GUARDS



McGill Industrial Lampguards give you an extra margin of quality—in materials and workmanship—that assure a safe dependable light; where you want it, when you need it. Parts and materials are all carefully selected for resistance to wear and abuse in rugged industrial service. 660 watt, 250 volt sockets. Choose the right lamp guards for your needs from the more than 100 different type offered by McGill.

Underwriters Laboratories Inspected

No. 7100 SR Lamp Guard

Clamp arrangement allows quick lamp changing without tools. Gray Neoprene-butyl handle, reflector, LEVOLIER® switch and extra heavy steel cage.

No. 5025 SRG Service Light

Completely grounded service light. 15 amp., 125 volt convenience outlet built into molded phenolic handle. Safe on-the-spot source for power tools, etc. 25 feet 16-3-SJ black rubber cord.

No. 5000 SR Lamp Guard

With 15 amp., 125 volt convenience outlet in impact and heat- and grease-resistant, positively insulating molded phenolic handle. No-Rol cage and reflector.

No. 3006 Vaporproof Lamp Guard

Watertight, vaporproof and moisture proof for complete safety. Heat and impact resisting glass globe screws into a silicone rubber gasket. Handle molded of macerated phenolic.

No. 652 Lamp Guard

Rubber hook handle, thumb release clamp for easy bulb replacement can be hung, for maximum light, from hook or handle.

FREE

Send for free copy
of McGill Catalog No. 84
... today!

No. 5000 SLRG Lamp Guard

Completely grounded. 15 amp., 125 volt 3-wire convenience outlet for 2 parallel blades and a U shaped blade for ground. Molded phenolic handle. Resists oil, grease, breakage, moisture and abrasion. End lens concentrates light.

MCGILL®
ELECTRICAL SPECIALTIES

*are always a little better
and ALL are Underwriters
Laboratories Inspected*

McGILL MANUFACTURING COMPANY, INC.

450 N. Campbell St., Valparaiso, Indiana

Tape it easy, Mac!



Gold Seal Tape swings easily in tight places

When you're trying to make a neat splice in cramped quarters, don't get mad. Get Gold Seal Plastic Tape. Those 20 ft. rolls are just the thing for working in terminal boxes and other confined areas. Easy to hang on to. Easy to "swing". Easy to mold into a neat, thin wrapping. And Gold Seal sticks and stays. It's a *quality* tape. Conventional tapes are for the birds!

Jenkins Bros., Rubber Division, 100 Park Avenue, New York 17.

Gold Seal Tape

IN HANDY 20 FOOT ROLLS

Gold Seal FRICTION — RUBBER — PLASTIC Tapes... Commercial and Specification Grades

Ten 20 ft.
rolls
in the
Handy Pack
can
Single 60 ft.
rolls
in individual
metal cans





The Powerful Power-Groove!

Radical new General Electric fluorescent lamp design can give your customers higher, more economical light levels



AT ERICKSON TOOL COMPANY (above), 450 G-E Power-Grooves, eight feet long, mounted 10 feet high, with 10 feet between rows, maintain a lighting level of 160 footcandles economically. This means there is plenty of light right at the machines (see footcandle reading at right)—where extra light means extra safety, extra accuracy for workers. No supplementary lighting is needed. Powerful Power-Grooves do it all!



Progress Is Our Most Important Product

GENERAL  **ELECTRIC**

While plans for their new building were still in the early stages, officers from Erickson Tool Company of Cleveland, Ohio, visited the Lighting Institute—General Electric's lamp headquarters at Nela Park. There they saw the whole array of lighting methods and discussed the powerful new G-E Power-Groove Lamps.

They were shown how these revolutionary lamps provide outstanding general lighting, making it unnecessary to use supplemental lighting on individual machines (like that used by Erickson toolmakers in their old plant). They saw how powerful Power-Grooves would fill a plant with pleasant light that's easy on the eyes . . . as well as the pocketbook. The decision was made: Erickson's new plant would have G-E Power-Groove Lamps throughout!

Because G-E Power-Groove Lamps give nearly twice as much light per tube as High-Outputs— $2\frac{1}{2}$ times as much as 8-foot slim-lines—your customers can get more light per fixture—with fewer parts to maintain. And compared to other fluorescent systems, they can save 5-20% on their initial investment.

Get the whole exciting Power-Groove story. Write General Electric Co., Large Lamp Dept. ECM-18, Nela Park, Cleveland 12, Ohio. Better still, visit Nela Park and let us show you on-the-spot demonstrations of how the powerful Power-Grooves can work for your customers.



WORLD'S BRIGHTEST WORKSHOP—Now you can see powerful Power-Grooves in action . . . lighting the world's brightest workshop. It's at the G-E Lighting Institute at Nela Park. Plan to visit it and see for yourself.

For absolutely Liquid-Tite Connectors specify

GEDNEY— every time!



THESE ARE THE NEWEST, most efficient liquid-tite connectors available today for use with Sealite* and equivalent liquid-tite conduits. Designed to give wiring installations absolutely dependable protection in these popular oil- and water-tight flexible raceways, Gedney Liquid-Tite Connectors are built for lifetime service.

As shown from left to right in the exploded views above, Gedney Liquid-Tite Connectors consist of:

1. Locknut—nut stock steel—cadmium-plated
2. Main Fitting—straight, 90° angle, or 45° angle—malleable iron—cadmium-plated

3. Grounding Bushing—one piece—threaded to engage conduit spiral

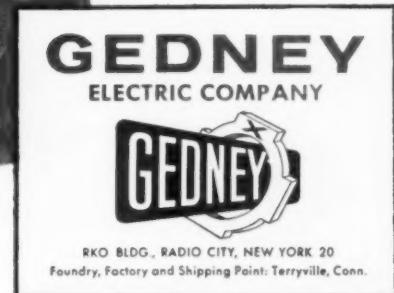
4. Molded Vinylite sealing ring—pliable—ever-lasting

5. Gland Nut—malleable iron—cadmium-plated

Standard sizes range from $\frac{1}{2}$ " to 2" straight, 45° and 90° . . . order Gedney Liquid-Tite Connectors for top safety and longest life.

* Sealite is the trade name of American Metal Hose Branch of the American Brass Company

GEDNEY FITTINGS FIT!



Diamond "Red D"

WIRE and CABLE

YOU KNOW THEM,
YOUR CUSTOMERS
KNOW THEM AS
QUALITY PRODUCTS

Accepted as one of the best in the industry, Diamond Wire products have earned this reputation through a continuing program of production control, research and product development. Your order on any Diamond product triggers immediate action... maximum service to you.



First portable cord for mill and plant use designed with tough, oil-resistant Type MD® neoprene sheath in Industrial Red for ready identification. *(Mill Duty).

Type MD®
(Mill Duty)
RED-D-Prene®



Thermoplastic insulated and jacketed non-metallic sheathed cable. Retards flame and has excellent resistance to moisture, corrosion, fungus, abrasion. Listed by UL.

Diamond
DUF®
Type UF



Non-sticking, smooth and easy to pull, Diamond DTX will not flake off. Moisture and flame resistant, it is clean to handle and strips easy.

Diamond DTX®
Non-Metallic
White Sheathed
Cable



Flexible steel armored cable ideally suited for general lighting and wiring in non-fireproof homes. Available in two, three and four conductor.

Diamond ABC
Armored
Bushed Cable



May be used without conduit from pole to building and down side of building in places not subject to mechanical injury. Listed by Underwriters' Laboratory.

Type SE
Service
Entrance Cable
(Armored and
Unarmored)



Diamond three-wire range cord sets are 36" long. Have rubber molded cap, molded on rubber jacketed cable—are complete with steel strain relief. UL approved.

Diamond
Range Cord
Set



DIAMOND
WIRE and CABLE Company
Sycamore Illinois

WAREHOUSE: BIRMINGHAM, ALABAMA

DOSSERT

Economy

D-LUGS



D 35



D 70



D 10



D 21



D 25



D 50



Here is a complete and low-priced line of D-LUGS. These connectors are more compact and heavier in weight to insure cooler operation under more severe loads, while being much easier to install. Only seven sizes accommodate from 14 SOL. to 1,000,000 CM.

FEATURES:

- Rugged construction
- Made of high conductivity copper alloy
- Suitable for all purposes
- Variable, each connector takes wide range
- Exceptionally compact
- Reusable

Write for detailed information and prices!



DOSSERT MFG. CORP.

249 Huron Street, Brooklyn 22, N.Y. Representatives in all principal cities

IN CANADA: W. S. Gerrie & Assoc., Ltd., Toronto

Another new development using

B.F.Goodrich Chemical *raw materials*



*Installation of Triplex wire manufactured
by Southwire Company, Carrollton, Georgia.*

*Here's a rugged
outdoor performer...*

TRIPLEX *insulated with* **GEON**

IT'S TOUGH, weatherproof, and maintains its exceptional electrical properties with age—that's why insulation of Geon polyvinyl materials is offered on Triplex line wire and service drops.

This wiring takes pulling over cross-arms, dragging along the ground and the other punishment that goes along with outdoor wire installation. The physical properties and aging characteristics exceed all accepted standards for this application.

The insulation of Geon polyvinyl materials shuns the sun, oxygen and ozone attack. In industrial areas, it withstands oils, greases and the effects of air-borne acids, alkalis and other chemicals. What's more, it resists flame, will not support combustion and has good flexing properties. The wire is light, small in diameter, free stripping, easy to handle and competitively priced.

For the greatest lifetime economy, choose wiring with this exceptional covering. For more information, write Dept. LS-1, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.



B. F. Goodrich Chemical Company
a division of The B. F. Goodrich Company

B.F.Goodrich

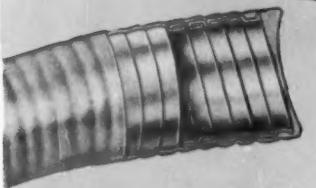
GEON polyvinyl materials • NYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

...that job calls for

COLUMBIA

FLEX-SEAL

the new **FLEXIBLE**
LIQUID-TIGHT
ELECTRICAL CONDUIT



BETTER!
MOLDED ON VINYL JACKET

(not a sleeve!)

- **JACKET CANNOT RIDE OR SLIP BACK**
- **FITTINGS GRIP SECURELY**
- **VIBRATION PROOF**

**REDUCES MAINTENANCE
PREVENTS SHUTDOWN
EASY TO WORK WITH**



FREE

Write for sample and
specifications brochure.

IT'S LIQUID-TIGHT!

Flex-Seal has been designed specifically to meet the most adverse conditions—in chemical plants, machine shops, printing plants, food plants, breweries—any installation, indoors or outdoors, subject to moisture, coolants, salt air, corrosive fumes, chemicals, greases, abrasives, and other conditions that create hazardous wiring with ordinary conduit.

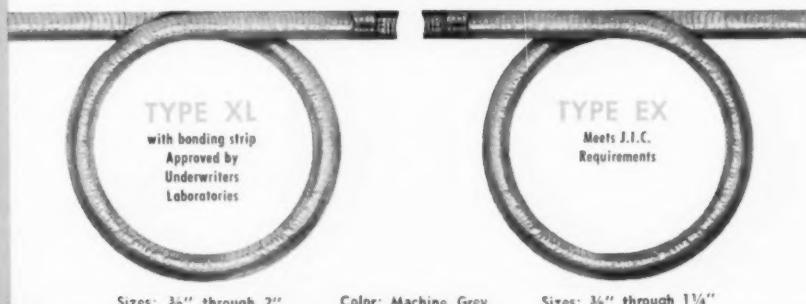
IT'S SUPER FLEXIBLE!

Because it bends easily to small diameters and because it fits the tightest corners and most irregular shapes, Flex-Seal is ideal for wiring on machine tools, motors, pumps, air conditioning towers, outdoor amusements, conveyors . . . machinery of every type.

IT'S ECONOMICAL!

Because the first cost is the last cost, Flex-Seal means genuine economy. It eliminates maintenance and prevents costly shutdown. Flex-Seal is easy to install too, cuts easily on the job without special tools. And, its machine grey finish stays cleaner-looking longer.

2 TYPES TO MEET EVERY REQUIREMENT



COLUMBIA CABLE & ELECTRIC CORP.

Serving the Electrical Wholesaler Since 1912

255 CHESTNUT STREET

BROOKLYN 8, N. Y.



Non-Metallic Sheathed Cable



E. M. T.



UF



Flexible Steel Conduit

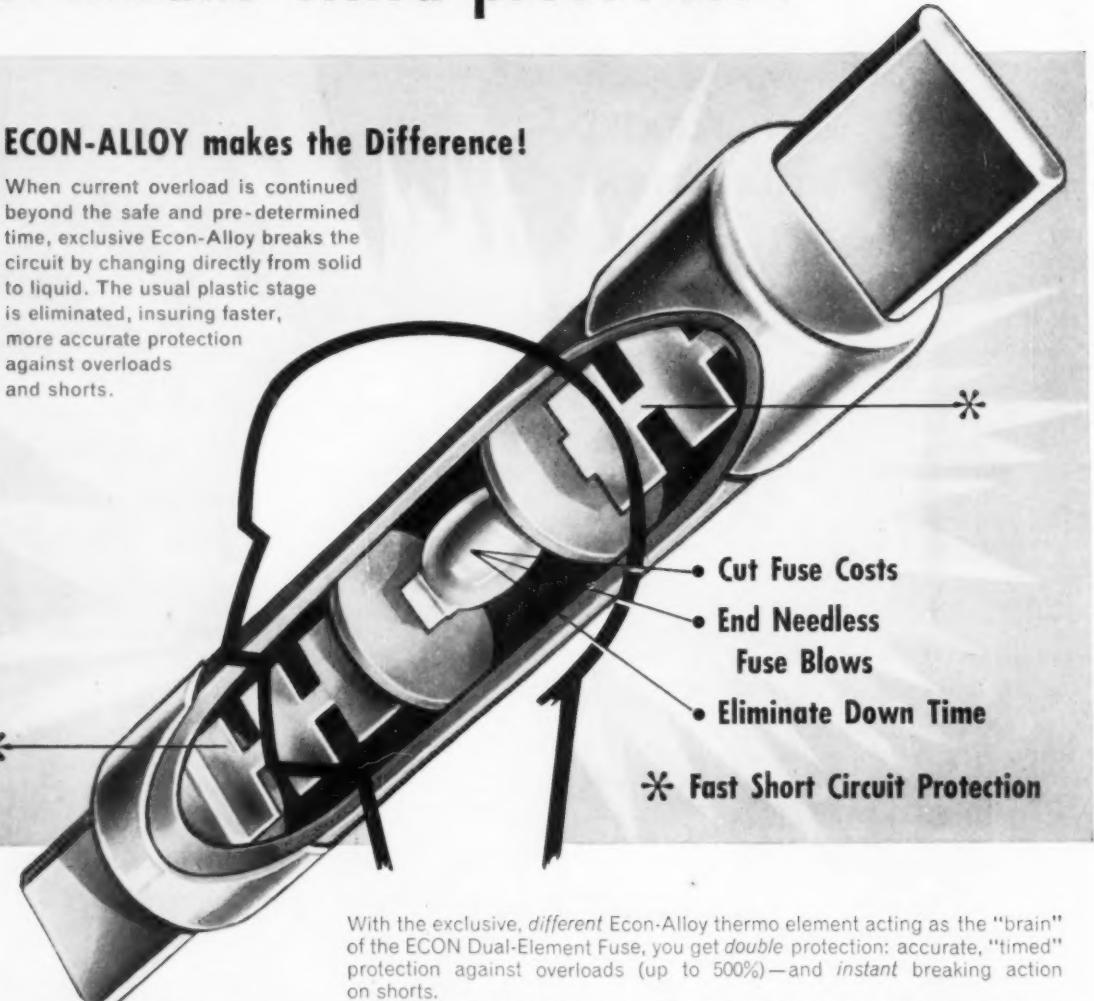


A.C.T.

IT THINKS with a difference that means extra protection!

ECON-ALLOY makes the Difference!

When current overload is continued beyond the safe and pre-determined time, exclusive Econ-Alloy breaks the circuit by changing directly from solid to liquid. The usual plastic stage is eliminated, insuring faster, more accurate protection against overloads and shorts.



ECON[®] **DUAL-ELEMENT** **cartridge fuses**

Order ECON Dual-Element and other Economy Fuses directly from your ELECTRICAL WHOLESALER

Write for ECON Dual-Element Catalog S-60
... or literature on all Economy Fuses.

ECONOMY FUSES FOR EVERY PURPOSE



1459

ECONOMY FUSE & MFG. CO., 2717 Greenview Avenue, Chicago 14, Illinois



Here's Why Square D's New Adjustable ALUMINUM FEED-IN DUCT

makes a lot of sense to me!



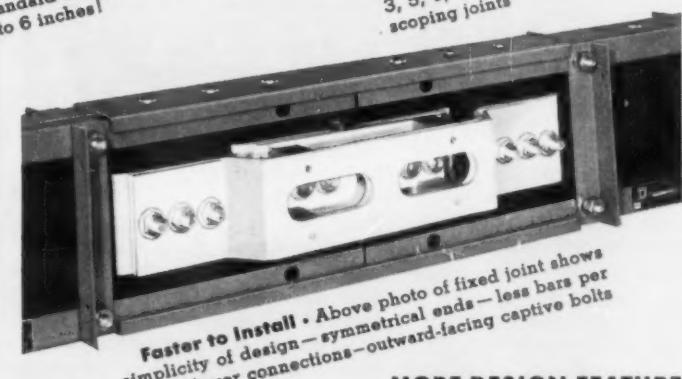
Telescoping joints with multiple slots permit infinite adjustability up to 12 inches when other than standard lengths are required. Standard elbows, T's, and X's telescope up to 6 inches!

*Needed-Rush!
85 feet; 3½ inches
1000 Amp, 3Ø4 wire
Feed-In Duct*

Fast delivery because any length requirement can be met with standard 3, 5, 7, or 10 foot lengths, plus telescoping joints



Completely adjustable
after it's hung. For example, if two ends terminate 6½ inches apart, connection can still be made with a telescoping joint



Faster to install • Above photo of fixed joint shows simplicity of design — symmetrical ends — less bars per phase — fewer connections — outward-facing captive bolts



Totally enclosed for safety
— at no price premium.
No de-rating necessary.
Square D's design eliminates need for ventilation

MORE DESIGN FEATURES

Thinnest cross-section available!
Tight spots, pipes and structural members present less problems

Easy transposition of phases,
using standard telescoping joint parts,
for maintaining balanced voltage on long runs

Certified short circuit tests by an independent testing laboratory have proved the superiority of Square D's continuously-supported bus design

Write for the complete story

Address Square D Company, 6060 Rivard Street,
Department SA, Detroit 11, Michigan

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE



SQUARE D COMPANY

Right off the -Wire

An all-electronic telephone exchange (said to be the first for commercial use) has no moving parts, is noiseless and can be used in explosive atmospheres. It includes a "memory" which will hold an incoming call.

&

Wire can be strung beside a railroad track by a new travelling crane at the rate of 60,000 feet per hour.

&

Simplex recently completed one of the largest and heaviest shipments of cable ever transported on one reel — nearly two miles of ANHYDREX XX insulated submarine cable weighing 60 tons.

&

A new rubber-like material is porous, but will contain liquids.

&

Boron, lithium, hydrogen peroxide and fluorine compounds are to be the fuels of a new bomber reported to be in the design stage.

&

Smog-causing chemicals from automobile exhausts can be eliminated by a chemical catalyst developed by an automobile manufacturer.

&

Improvements in the explosive rivet have made it noiseless.

&

Only the touch of a hand is needed to light a new lamp. The electricity in the hand does the work.

&

Thorium is about three times as plentiful as uranium. A new process for the production of reactor-grade thorium should lead to a reduction in the cost of atomic fuel.

&

A high-output ultraviolet lamp, for heating and air-conditioning ducts, is claimed to be 1,000 times more effective in killing viruses and bacteria than an equal amount of radiation from the sun.

The world's largest solar furnace is to be completed in 1959. It will produce temperatures as high as 8,000°F, which is about 70% of the temperature of the sun's surface.

&

An ultra-hard glass has been developed that retains its hardness up to 1508°F.

&

The cost of converting sea water to fresh water has been reduced from \$1.50 to 60 cents per thousand gallons.

&

"Talk-back TV", a new advance in educational television, enables a pupil to ask questions of a teacher who is broadcasting from a distant room.

&

Scientists have been able to produce shock waves with speeds of more than 100,000 mph (above Mach 150) involving temperatures higher than 100,000°F.

&

Some 1958 automobiles are using aluminum instead of copper in battery cables.

&

The first deep sea telephone cables to utilize the revolutionary new Bell Laboratory vacuum tube repeaters were manufactured by Simplex. Minimum tube life is expected to be 20 years.

&

Danish trawlers are using nylon propellers. The four-foot, three-bladed size weighs only seventeen pounds and they reduce vibration, resist impact damage and corrosion.

&

A cell that generates electricity by the chemical action of oxygen and hydrogen has been announced. It avoids some of the disadvantages of both dry cells and storage batteries.

&

An airplane has been built which can change its shape while in flight for the purpose of testing aerodynamic configurations.

C-L-X (Sealex) is the name of a new, completely sealed, corrugated metallic cable sheath manufactured by Simplex. It is pliable, moistureproof, and permits cable engineers to select the most economical cable cores, while assuring the greatest mechanical protection available.

&

Observations of the aurora during the Geophysical Year show that it occurs simultaneously at both the North and South Poles. This definitely identifies it with the earth's magnetic field.

&

A miniature battery about the size of a paper clip is said to deliver a steady flow of current for 176,000 hours.



Shirtsleeve Service

Simplex recently completed an order for 4600 ft. of Anhydrex XX Parkway Cable. The Simplex man was on the spot to help with installation, which happened to be on a 9,500 ft. mountain in rough terrain. He helped design a reel mounting bracket (for holding up to 7200 lbs.) for the front of the tractor used for laying. He supervised the laying of two lengths 2200 feet long.

This case typifies the kind of cooperation that Simplex offers in order to assure correct installation and satisfactory service.

SIMPLEX WIRE & CABLE CO.

Cambridge, Massachusetts and
Newington, New Hampshire

Simplex

High quality cables for: Mining
Power & Lighting • Construction
Transportation • Communications
Signalling

See us at Booth 1124 Plant Maintenance & Engineering Show, Chicago

Modernization for Missiles

Successful satellite launching by the Russians last year set off a searching revaluation of our missile program and, probably, our whole defense posture. In any event, we can be sure that a new economic climate is about to emerge in the U.S. It may have profound effects upon our industrial resources and the deployment of skilled manpower. Our missile program is still largely in the research and development stage. As production models are achieved, this will bring billions of dollars in orders for the manufacture of new and novel devices of extraordinary technical complexity. At the same time, bases must be built in a great many places and equipped with elaborate electrical and electronic apparatus.

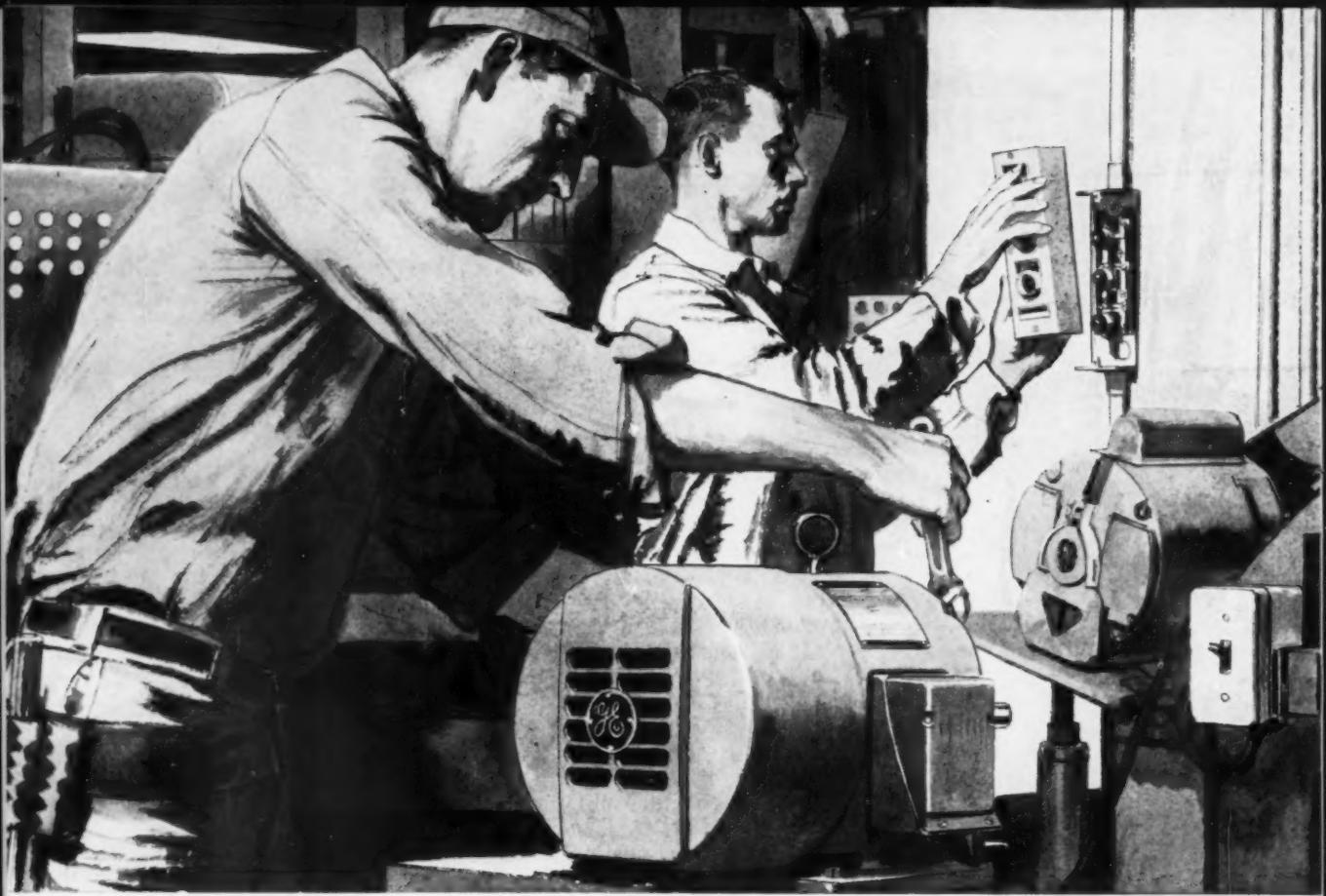
Some production needs will call for great new plants. But much, if not most, of component manufacturing will be directed, by the usual procedures of subcontracting, into existing plants and handled by the modification or alteration of existing processes and equipment. With the prospects of wide dispersal of a good share of missiles production and new requirements related in one way or another to the accelerated defense program, it is time to take a new look at how well-equipped our industrial plants are electrically.

Some indication of the ability of existing industrial plant electrical systems to cope with growth was revealed by A. C. Monteith of Westinghouse in a report to NEMA last November. A survey covering 550 major manufacturing plants found that none had enough main transformer capacity to handle a normal 10 years growth; 52% had low incoming voltage; 85% had inadequate main breaker capacity; 89% had no main substation bus protection. If these significant conditions prevail in large plants under full engineering control, it is not likely that the great majority of smaller plants are in any better shape, on the average, to accommodate substantial new demands on their electrical systems.

The need for a "Power-Up" program for industry at this time could hardly be more crucial. If, as the daily observation of our readers will certainly confirm, existing industrial electrical systems are short on capacity for normal growth, it is reasonably sure they are in no shape to accommodate an accelerated defense production program.

Fortunately, the modernization of industrial electrical systems can be advanced immediately through the regular channels of trade in the electrical industry. In the individual plant, the need is usually obvious. The challenge is to get the job done now before a lot of scarce manpower is drawn off for other projects which threaten to absorb an increasing share of our skilled craftsmen.

Wm. T. Stuart



Exactly the right G-E motor in type, speed and power for every drive job is ready for you through any Graybar location. Through the same convenient source you, and your customers, can get experienced help in picking the

right controls. To insure proper selection, you don't need to know all about all controls. Just know — and use — the phone number of your nearest Graybar office.

How to pick the one best MOTOR and CONTROL for any power drive you may have

In a single day you may have several different motor problems. You may need high starting torque for one job, constant speed for another. And often your motors have to work dependably in dusty, dirty air. For each job, and for every other motor drive need, there is one best G-E Tri/Clad motor to do the work with complete satisfaction. And matching control. For precise selection and prompt, friendly help you and your customers can rely on Graybar.

Through more than 130 Graybar offices and warehouses too, you and your customers have, conveniently available, motors, controls and over 100,000 electrical items. Further, Graybar Specialists, strategically located throughout the United States are ready and willing to give you the full benefit of their broad experience in motors, control, wiring, lighting, ventilation, electronics and communication. When you need help or advice, scheduled or emergency shipments, on *anything electrical*, always CALL GRAYBAR FIRST.

741-41



These two bulletins give you valuable help in the selection of motors and controls for specific jobs. Send now for your copies.

CALL **GraybaR**

FIRST FOR

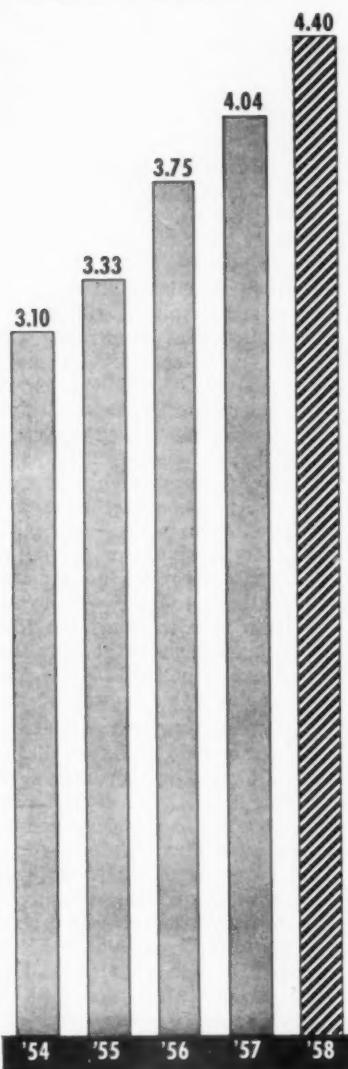


GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK, IN OVER 130 PRINCIPAL CITIES

Outlook for 1958

- Electrical work up 10%
- Construction up 5%

Electrical Construction Activity
with 1958 projected
in billions of dollars.



Advancing standards and price increases are expected to push electrical work ahead of construction trends this year.

By W. T. Stuart

ELECTRICAL construction, installation and maintenance activity, in dollar volume, is expected to rise moderately over 1957 this year. Some of the gain will reflect higher prices and wage increases. Some will represent advancing technical standards such as provisions for higher levels of lighting, air-conditioning loads and other developments tending toward more electrical utilization in almost all categories of building.

Construction as a whole will advance about 5%, according to the Department of Commerce and Labor. However, this gain reflects expected increases in costs. Physical volume of construction is likely to remain substantially at or about the same level as '56 and '57.

Less optimistic is the outlook for capital spending by industry as surveyed by the McGraw-Hill Department of Economics in late 1957. Reports indicate that business now plans to reduce capital expenditures in 1958 by 7% from 1957 with the reduced level to persist through 1959. However, the new level is still 20% more than 1955 and only slightly less than 1956.

With the supporting prospects in overall construction and capital expenditures indicating a high level of activity through the year, the crucial aspect of 1958 for the electrical construction industry will be the extent of further advances in the application of modern standards of convenience, adequacy and utilization to current construction and the modernization of existing buildings. For such technical progress, the prospects appear to be excellent.

Electrical work continues to take an increasing share of the building dollar, reflecting primarily higher intensities and more extensive equipment installation in lighting, rapidly expanding system requirements for air conditioning, higher horsepower drives with more complex controls in industry and more elaborate signal and communication requirements in buildings. The trend in all these areas of electrification is upward.

Continued vigorous promotion of residential electrification is already set for the year. The major programs, Housepower and Live Better Electrically, are expected to pick up momentum in support of im-

Electrical Work

(millions of dollars)

	1956	1957	1958#	% 1957 to 1958
Private Funds				
Residential	670	692	774	+11
Industrial	459	498	473	- 5
Commercial and Institutional	640	703	774	+10
Utilities	382	397	438	+10
Farm	75	84	88	+ 5
Other	6	9	11	+20
Total private	2,232	2,383	2,558	+ 7
Public Funds				
Residential	7	16	29	+18
Industrial	64	71	74	+ 4
Educational	312	356	396	+12
Institutional	38	87	97	+11
Military	48	34	31	- 9
Highway, conservation	248	240	273	+13
Other	38	27	27
Total public	755	831	927	+12
Total new work	2,987	3,214	3,485	+ 8
Maintenance and Repair	760	830	920	+10
	3,747	4,044	4,405	+10

Electrical Construction & Maintenance
estimated

Plans for Capital Spending

(millions of dollars)

	1956	1957	1958	1957-1958 % Change
	Actual	Estimated	Planned	
All Manufacturing	\$12,787	\$13,904	\$11,614	-16%
Petroleum Industry	5,531	5,962	6,038	+ 1
Mining	443	460	375	-18
Railroads	1,231	1,457	1,064	-27
Other Transportation & Communications	4,229	4,530	4,575	+ 1
Electric & Gas Utilities	4,895	6,254	6,441	+ 3
Commercial	8,236	6,955	6,885	- 1
All Business	36,641	38,633	36,059	- 7

Source: U. S. Dept. of Commerce and McGraw-Hill Dept. of Economics

proved electrical adequacy standards for new and existing homes.

Construction Outlook

Outlays for new construction are expected to total \$49.6 billion in 1958—5% above the record expenditure of \$47.2 billion evident for 1957, according to outlook estimates prepared jointly by the Departments of Labor and Commerce. This rate of dollar outlay would mark 1958 as the second highest year in the physical volume of work put in place exceeded only by 1955.

The \$2.4 billion expansion in 1958 construction will be mostly in residential building (private and public) and on highway work, which altogether are expected to

account for \$2.1 billion of the gain. Expenditures for almost all other major types of construction will probably rise moderately, or remain at about the 1957 level. Expected declines in industrial and military facilities are likely to be sharply reversed as a result of revaluation of our defense program in the coming months.

Reflecting the anticipated reversal of the 1956-57 downturn of private housing activity, total private expenditures for new construction are expected to contribute more to the total 1958 expansion than public—rising by \$1.4 billion to \$34.7 billion, compared with a \$1-billion increase to \$14.9 billion for public projects.

Residential Building

A strong advance in total new residential building (private and public) is anticipated for next year (8%, from \$17.0 billion to \$18.4 billion). This represents an expected 6%, \$675-million increase in new private non-farm dwelling units to be put in place, and, in addition, rapidly rising expenditures for additions and alterations to existing housing (up \$335 million), and for construction of public residential buildings (up \$345 million).

Private non-residential building construction for the first time in six years will not show an increase in outlays. This is primarily due to an expected decline in industrial construction of about 9%. Long-range expansion programs for the construction and modernization of many plants have been largely fulfilled, and a substantial volume of new capacity has been added in the past three years. The value of contract awards for new plants began tapering off in mid-1957. This trend is expected to continue in 1958. However, spending in this sector will still be about one-fifth greater than in 1955. In general, expenditures for other non-residential building groups, with the exception of office building, warehouses, and hospitals, will probably be maintained at or near the 1957 values. In the case of office buildings and warehouses, the general high volume of business activity and the relatively low vacancies, especially in buildings with more desirable features and convenient locations, promise another year of expansion to bring annual outlays above the \$2-billion mark for the first time. Hospital construction will continue to show substantial growth in 1958, to almost the \$600-million mark, despite the more than 50% increase in 1957. Federal-aid has stimulated this growth.

Outlays for stores, restaurants, and garages will stabilize at slightly above 1957 levels, following a sharp drop this year. Completion of many new large regional and community shopping centers started in previous years dominated activity in 1957, when a declining number of such projects were begun. There are, however, prospects that continued suburban growth and high retail sales will help maintain the present annual outlays for this group. Private school building, which also declined in 1957, will

return to approximately the 1956 level.

Farm construction expenditures will remain unchanged from the last few years, in line with the relative stability of farm income.

The strongest single sector of non-residential private construction in 1957 was public utilities. Prospects are that next year this group will show a 6% advance in spending—about half the 1957 rate of increase. The tight money market and moderating pressures for increased output have resulted in some stretching out of existing long-range expansion programs. Nevertheless, an aggregate of \$6 billion will be reached for the first time in 1958. This will be one-fifth greater than 1956 expenditures. The chief areas of spending will be for electric power and gas facilities, for which the increase will be over 10%. A \$2-billion record should be attained in 1958 for gas facilities construction, about double the spending rate of three years ago. Both the railroad and telephone expenditures are expected to decline by almost 10%. However, in the case of the latter industry, spending in 1958 at the billion-dollar level will still be more than one-third above the expenditures of four years ago.

Public Construction

Almost all of the expected \$1-billion rise in public construction to \$14.9 billion will come from State and locally owned projects, and 60% of it will be accounted for by the new interstate highway program. Prospects are that total outlays for public highways, streets, and roads will rise sharply, by 14%, to \$5.5 billion, and that nine-tenths of the gain will occur on the 41,000-mile federally aided system initiated in 1956, for which expenditures (90% Federal and 10% State) will expand from about \$250 million this year, to \$850 million in 1958.

Public educational outlays in 1958 are expected to reach the \$3-billion mark, accounting for one-fifth of all public expenditures for new construction. This is more than three times the level in 1949, reflecting the relentless demand for more schoolrooms in the wake of substantial development of suburban areas, the large rise in the population of children of school age in the post-World War II period, and the low

building rate of the 30's and 40's.

The expected decline of 14% in expenditures for military facilities, to \$1.1 billion, continues the decline begun this year, and reflects both reduced appropriations and completion of many support facilities begun during the 2-year expansion in 1955 and 1956.

Utility Expansion

Electric utility capital expenditures will increase around 8.9% to pay for the record expansion scheduled for 1958 according to *Electrical World*. Spending for new generating facilities will jump 10% to \$2.5 billion. While a good part

of this will be final payment on the 16.4 million kilowatts to be installed in 1958, a sizable portion will be spent in preparation for the addition of another 15.2 million kilowatts in 1959.

Tying new generating plants to load centers will require the expenditure of \$821 million for transmission facilities, 5% more than this past year. Spending on distribution systems will increase 8% to almost \$1.8 billion in preparation for load growth expected over the next few years. With another \$225 million required for new warehouses, service centers, office buildings and vehicles, total utility spending will swell to almost \$5.3 billion.

New Construction in the U. S. with 1958 Projected

(millions of dollars)

Type of Construction	Value (in millions)			Percent change 1957-58
	1956	1957	1958	
TOTAL NEW CONSTRUCTION	\$46,060	\$47,200	\$49,600	+ 5
PRIVATE CONSTRUCTION	33,242	33,300	34,700	+ 4
Residential buildings (nonfarm)	17,632	16,530	17,575	+ 6
New dwelling units	13,490	12,125	12,800	+ 6
Additions and alterations	3,695	3,915	4,250	+ 9
Nonhousekeeping	447	490	525	+ 7
Nonresidential buildings (nonfarm)	8,817	9,155	9,150	-
Industrial	3,084	3,170	2,875	- 9
Commercial	3,631	3,585	3,775	+ 5
Office buildings and warehouses	1,684	1,870	2,025	+ 8
Stores, restaurants, and garages	1,947	1,715	1,750	+ 2
Other nonresidential buildings	2,102	2,400	2,500	+ 4
Religious	768	870	870	0
Educational	536	525	540	+ 3
Hospital and institutional	328	505	590	+17
Social and recreational	275	300	300	0
Miscellaneous	195	200	200	0
Farm construction	1,560	1,600	1,600	0
Public utilities	5,113	5,825	6,150	+ 6
Railroad	427	450	400	-11
Telephone and telegraph	1,066	1,075	1,000	- 7
Electric light and power	1,845	2,100	2,350	+12
Gas	1,400	1,800	2,000	+11
Other public utilities	375	400	400	0
All other private	120	190	225	+18
PUBLIC CONSTRUCTION	12,818	13,900	14,900	+ 7
Residential buildings	292	505	850	+68
Nonresidential buildings	4,072	4,470	4,710	+ 5
Industrial	453	455	450	- 1
Educational	2,549	2,830	3,000	+ 6
Hospital and institutional	298	330	340	+ 3
Administrative and service	362	430	470	+ 9
Other nonresidential buildings	410	425	450	+ 6
Military facilities	1,395	1,275	1,100	-14
Highways	4,470	4,825	5,500	+14
Sewer and water systems	1,275	1,345	1,270	- 6
Sewer	701	785	750	- 4
Water	574	560	520	- 7
Public service enterprises	384	395	400	+ 1
Conservation and development	826	965	950	- 2
All other public	104	120	120	0

Source: U. S. Dept. of Commerce and U. S. Dept. of Labor



SEEING COMFORT keynotes the artistic and functional lighting in the new American Hardware Mutual Insurance Co. building, Minneapolis, Minn.

Low Brightness Troffers Give

High Comfort In Office Lighting

DIVISION

Electrical Contractors

CLASSIFICATION

Office Lighting

AWARD

First Prize

PROJECT

American Hardware Mutual
Insurance Co.

Minneapolis, Minn.

WINNERS

H. E. Fraser

Langford Electric Corp.

Minneapolis, Minn.

L. W. Johnson

Thorshov & Cerny

Minneapolis, Minn.

AN UNUSUALLY modern and attractive lighting system, incorporating high efficiency and many functional, and high quality design features, was used to light the modern new four-story home office building of American Hardware Mutual Insurance Company, Minneapolis, Minn. It is a recessed, low-brightness troffer lighting system, which conforms to the building module, and uses standard 40-watt T17 2-lamp Alzak aluminum reflector units modified to provide maximum visual comfort.

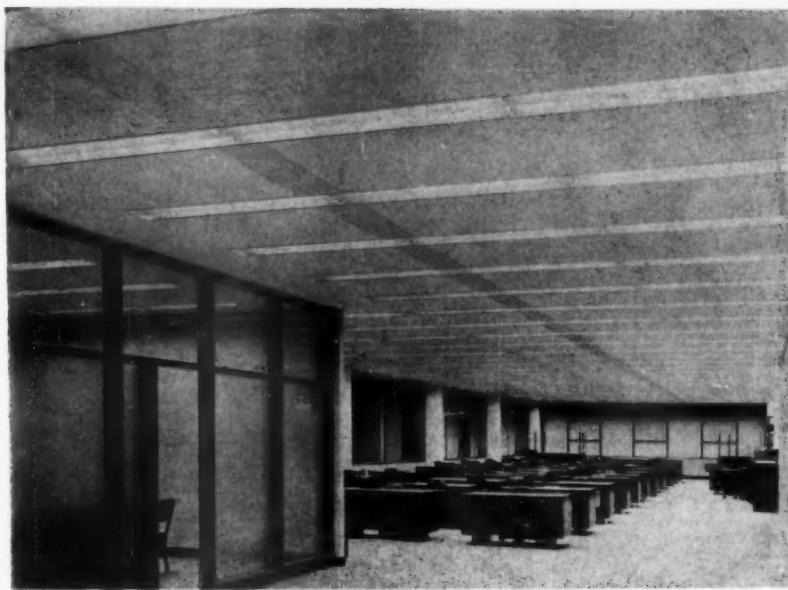
The lighting layout for a typical floor is shown in the accompanying drawing. The 2-lamp troffers are installed in continuous rows, run normal to the length of the building, and spaced on 4-ft 8-in. centers. The troffers are recessed flush in the 10-ft-high ceiling, and are run as close as possible to the walls to provide maximum wall illumination.

This basic lighting plan provides a lighting intensity of 70 foot-candles average, maintained. The

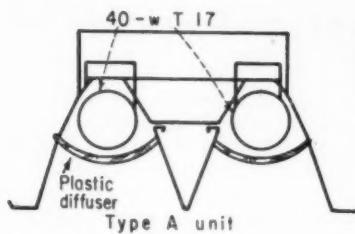
lighted area per floor is 26,000 sq ft, and the total connected load per floor is 87 kw, or 3.3 watts per sq ft. Thus the system provides 21.2 footcandles per watt per sq ft.

Recessed troffers of the low brightness, open type, were selected for this building only after various lighting systems were considered and analyzed in detail. Their use permitted maximum accessibility to all ceiling components for maintenance and repair, as well as optimum conditions for changes in partitioning which may occur during the life of the building. These troffers also effectively reduce the contrast between the units and adjoining non-luminous ceiling surfaces to a desirable minimum.

Standard 2-lamp Curtis Alzak troffers were used, modified by the addition of a plastic diffuser under each lamp, as shown in the cross-section detail of the troffer. These diffusers further improve seeing conditions, as well as the artistic appearance of the completed instal-



LOW BRIGHTNESS recessed troffers provide clean, modern appearance and average lighting intensity of 70 footcandles maintained throughout the building.



CROSS-SECTION of troffer shows special plastic shield used to reduce both direct and reflected glare. Shield is easily removable for cleaning, which also simplifies lamp renewal.

lation. The shielding angle to the luminous plastic diffuser is 25 degrees which, on the low 10-ft ceiling height, adequately shields all units in the normal line of vision.

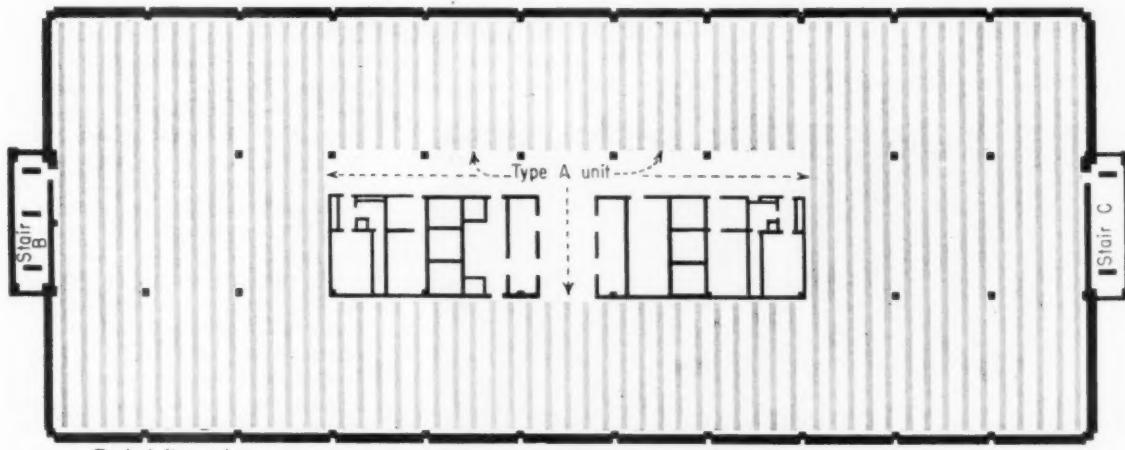
These diffusers further reduce the brightness of the low-brightness T17 lamps so that reflected glare is reduced to a minimum. And by being recessed up within the reflec-

tors, only the low brightness sides of the aluminum reflectors are visible within the direct glare zone, so that maximum visual comfort is maintained throughout all work areas.

This lighting system is easy to maintain. Diffuser shields snap into grooves in the reflector sides, and are hinged on a specially constructed V-bar member for easy removal. The V-bars are supported by chains. Alzak reflectors provide a permanent reflecting surface that is hard, smooth and easy to clean. The owners report an average cost of 12 cents per fixture per cleaning.

Color is used for finish on wall areas, columns, etc., to add interest and harmony to the areas. Various colors are used, which have an average reflectance factor of approximately 40%. Floors are finished in light gray with 45% reflectance. Furniture is finished a battleship gray, with 35% reflectance. And ceilings are all an off-white color, with 78% reflectance. In viewing the large open office areas either crosswise or lengthwise the brightness of visible parts of the troffers conform to the ceiling brightness so that a fairly uniform ceiling appearance results. The ratios between brightness in any area are well below the generally accepted range of three to one, which is considered excellent.

This lighting system was designed by Thorshov & Cerny, architects and engineers for the building. It was installed by Langford Electric Co., electrical contractors, who also installed the 265/460-volt electrical distribution system.



Typical floor plan

TROFFERS are continuous row 2-lamp type, installed on 4-ft 8-in centers in 10-ft high ceiling. Troffer spacing conforms to the building module, provides for maximum lighting and space flexibility. This floor plan is typical for the building's four floors. Fluorescent lamps operate from a 265/460-volt electrical distribution system.



LIGHT adds new beauty to Washington Monument (left) and Erickson Fountain, located at the Art Museum Traffic Circle, Philadelphia, Pa.



Floodlighting Accents Beauty of Monument and Fountains

DIVISION

Electrical Contractors

CLASSIFICATION

Outdoor Lighting

AWARD

First Prize

PROJECT

Washington Monument and
Fountains
Philadelphia, Pa.

WINNERS

Edward B. Barber
Independent Wiring Co.
Philadelphia, Pa.
G. William Wagner
Philadelphia Electric Co.

FLOODLIGHTING has been used most effectively to illuminate the statuary and fountains of the Washington Monument and Erickson Fountains, in Philadelphia, to bring out new and formerly unknown beauty of this grouping, and to extend the viewing time for this artistic setting into the evening hours. These monuments and fountains form the Art Museum traffic circle, most prominent location on the Benjamin Franklin Parkway drive over which thousands of motorists pass daily. The Art Museum sets on higher ground beyond the circle, and provides a magnificent

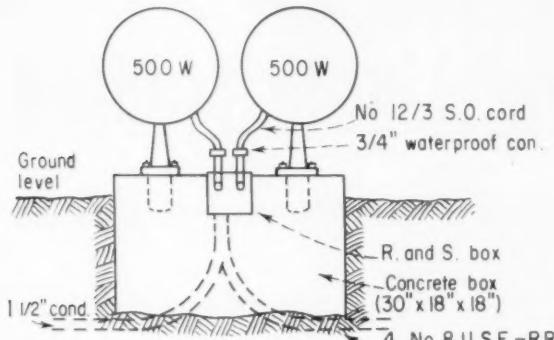
setting for the monuments as viewed from the downtown entrance to the parkway.

The Washington Monument and fountains consist of a central equestrian group (see plan and photo), flanked by four small falls-type fountains between pairs of reclining animal figures. The figures, by their size alone, dwarf the fountains. Thus, in studying the lighting problem, it was recognized that below-water lighting of the four fountains would be effective for the fountains only, but that a good general floodlighting plan would best accent the beauty of all the group figures and still produce a reasonably satisfactory effect on the fountains. Furthermore, structural design of the fountains made underwater lighting highly impractical, because of the shallowness of water in the fountains.

The floodlighting plan includes 32 500-watt Type RD-14 Benjamin enclosed floodlights, installed on 16 concrete pads, two units to a pad, located around the perimeter of the monuments (see plan) between the curbline and sidewalk. These units are of the medium, adjustable beam focus type, each equipped with a stippled glass cover. They are concealed from the view of motorists



UNDERWATER lighting units add sparkle to water spray of Erickson Fountain, reveal true beauty of the graceful cast bronze basin.



MOUNTING for floodlights is 16 concrete pads installed in grass plot at outer edge of sidewalk around monument. Electric service is supplied from water pump room.

by new shrubbery planted for this purpose.

The only available source for electric power for these floodlights was 2-phase, 4-wire, 240-volt service, used as the power supply for the water pumps. Thus 240-volt lamps are used in the floodlights. Electrical distribution is underground from the power panel in the pump room, as indicated on the single line wiring diagram shown on this page at right.

The Erickson Fountain, a gift to Philadelphia by the Swedish-American Society in memory of John Erickson, famous ship designer and builder, has an outstandingly beautiful and graceful basin of cast bronze. Also, it has a heavy jet of water spouting above the upper basin and falling water from the upper basin into the lower pool. The arrangement is ideal for underwater lighting, which is the lighting system that was selected and installed.

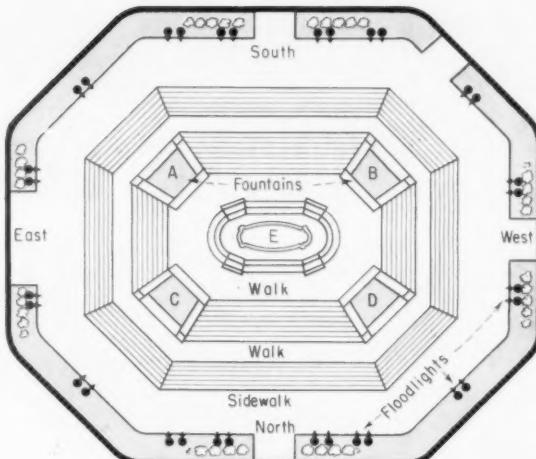
The falling water is lighted by 24 Russell & Stoll underwater-type units, installed in the lower basin in six groups of four units each, forming a hexagon following the structural form of the fountain base. Standard 150-watt A-25 lamps are used in these units.

The upper fountain jet is lighted with four 400-watt underwater units, each fitted with a fluted lens. These units are located so that the light beam pattern forms a square.

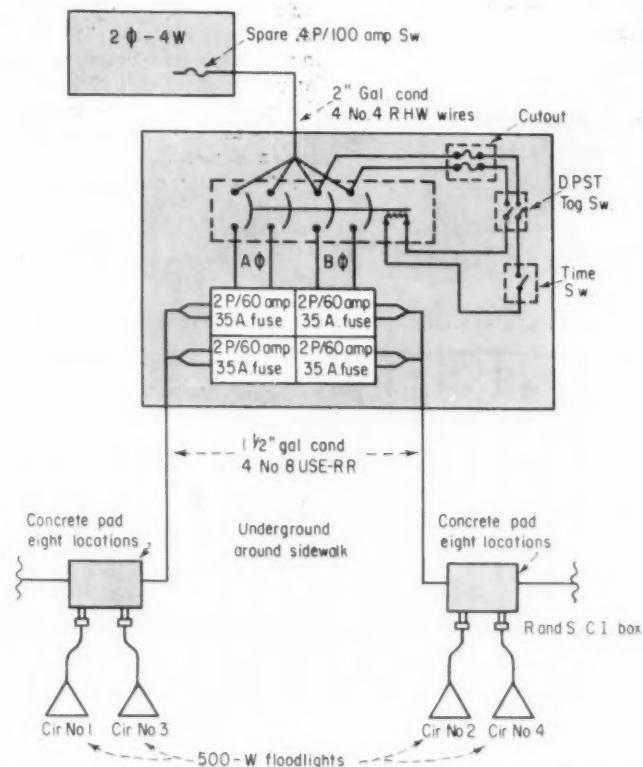
The impact of these beautiful lighting jobs has been tremendous. The Swann Memorial Fountain in Philadelphia has already been

lighted, as a result, and lighting for the Memorial Fountain and Tomb of the Unknown Revolutionary Soldier is under contract. Lighting for still other similar projects is in the design stage.

The floodlighting designs for the Washington Monument and Erickson Fountain were made by G. William Wagner of Philadelphia Electric Co., working with the Fairmount Park Art Association. The installation was made by Independent Wiring Co., electrical contractors, who supplied the electrical wiring and installation know-how which helped to make the job possible.



PLAN of Washington Monument shows location of the 32 500-watt floodlights which light the equestrian figure E, and the animal figures at fountains A, B, C and D.



WIRING installation for floodlights is shown by this single line diagram.

Luminous Ceiling Lights Modern

and Enhances Architectural Design



DIVISION

Electrical Contractors

CLASSIFICATION

Institutional Lighting

AWARD

First Prize

PROJECT

West End Library

Hamilton, Ont.

WINNER

James D. Harrison

Bennie Electric Ltd.

Hamilton, Ont.

THE ceiling in the ultra-modern new West End Library at Hamilton, Ont., serves a variety of purposes. Most important of all, it is a lighting system—a translighted luminous ceiling. Of almost equal importance, it is an architectural design element, serving as a luminous design feature both inside the building, and outside. Further, it incorporates the acoustical control for the main library area, diffuses the conditioned air throughout, and conceals the overhead construction details.

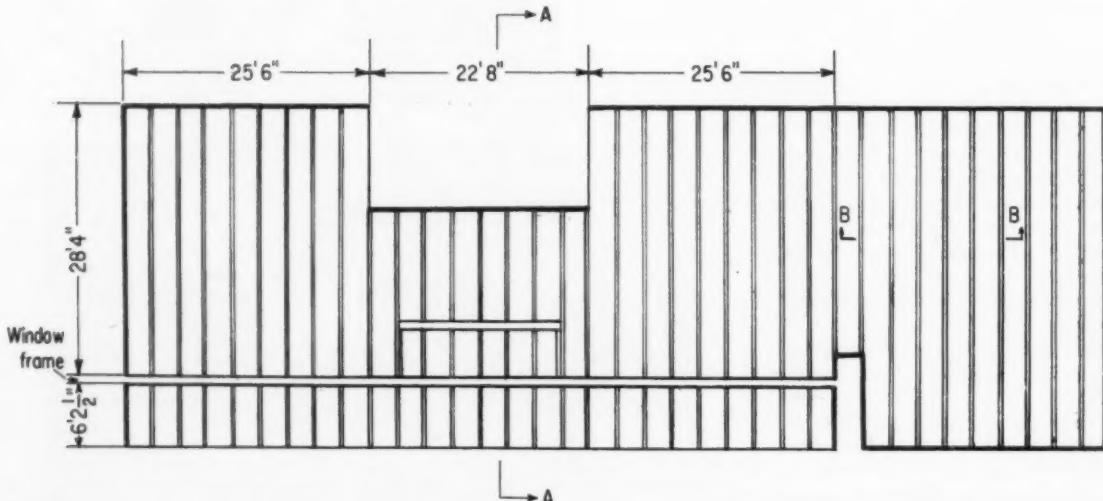
This multi-purpose ceiling is a Wakefield luminous ceiling, complete with corrugated acrylic plastic diffusers, tee-rail supports, acoustical baffles, wireway channel housings, and rapid start fluorescent lamps. It extends wall-to-wall over the library area as a lighting unit and to the exterior as a luminous design element.

The plastic diffuser panels are

installed 32 in. below the plenum cavity ceiling, and 10 ft 6 in. above the finished floor. The tee rails were spaced 2 ft 10 in. on centers, running from front to rear of the 28 ft by 100 ft interior area. Sound baffles were attached to the bottom of the tee rails. The fluorescent lamps were installed on 2 ft 10 in. centers, and centered 18 in. above the plastic diffuser panels. The plenum cavity was painted with an 87% reflectance paint for maximum reflection and efficiency.

As an architectural design feature, and to attract the attention of the public, the luminous ceiling in effect extends through the plate glass windows and window mullions, for a horizontal distance of approximately 5 ft. Then it turns up at an oblique angle of 60 degrees to the roof line. This can be seen in the exterior view photo, and is shown in cross-section A-A.

The close spacing of the acoustic



SOUND BAFFLES are spaced 2 ft-10 in apart, provide design pattern and shielding effect for the acrylic plastic diffusers which form the ceiling. Continuous rows of cool white fluorescent lamps are centered 18 inches above each diffuser panel.

Library

baffles gives a shielding effect in the normal 0 to 45 degree zone, from horizontal, so that very little of the luminous plastic is visible, except at the high overhead angles. This creates the rather pleasant sensation of being outdoors with only the sky overhead.

A major problem in the installation of this luminous ceiling was that of making it appear as an integral part of the structural design. Thus care was taken to form and fit the acoustical baffles right into the plaster on the inside wall. The baffles were carried through to the windows and extended to the outside to give the effect that the baffles were formed through the glass. At the windows on each end of the building, half baffles were used and fitted to the window line, to aid in the illusion of complete integration with the building structure.

In order to make the outside ceiling area dustproof and windproof, the acrylic plastic diffusers were installed in sponge rubber at the tee rails, which effectively seals the inner chamber from the outside elements. The luminous ceiling also extends over the main entrance doors. A special air screen arrangement was installed on either side of the glass door, under a metal hood installed above the plastic diffuser line, which solved the pressure buildup between exterior and interior.

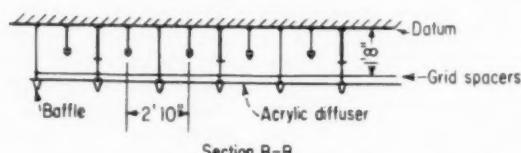
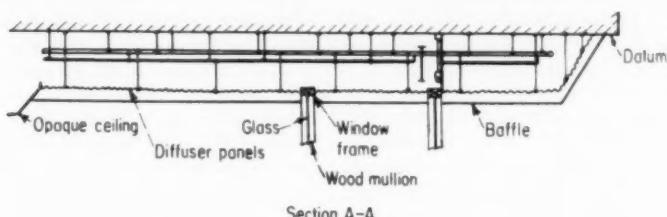
This lighting idea was conceived by the architect and consulting engineer for this building, and worked out with the aid and assistance of the manufacturer's representative. Responsibility for its installation, which required close cooperation with the general contractor, and on-the-job cutting and fitting, was handled by Bennie Electric Limited, electrical contractors of Hamilton, who did all the electrical work.



LUMINOUS CEILING is integrated part of structure in West End Library, Hamilton, Ont., and provides 80 footcandles of illumination, plus acoustic control, diffusion for air conditioning, and artistic design treatment to building.



ILLUMINATION from luminous ceiling is diffused throughout entire library area, and cool white fluorescent lamps give impression of daylight continued.



SECTIONS through ceiling and cavity show location of wiring channels and lamps above diffusers, and how ceiling extends beyond glass front of library.



Recessed Incandescents Provide

IDEAL LIGHT FOR SUPER

DIVISION

Electrical Contractors

CLASSIFICATION

Store Lighting

AWARD

First Prize

PROJECT

Jerry's Supermarket
Phoenixville, Pa.

WINNERS

A. J. Hasson
Electrical Contractor
Phoenixville, Pa.
Arthur V. Schafer
Philadelphia Electric Co.
Philadelphia, Pa.



INCANDESCENT lamps, in recessed prismatic glass reflectors, provide 48 footcandles of uniform illumination throughout sales area, display all merchandise in flattering light of excellent color quality. Fluorescent lamps light white plastic valance and wall cases around store perimeter.

INCANDESCENT lamps, installed in recessed reflectors, provide a lighting level of 48 footcandles average, maintained in service, in the general sales area of Jerry's Supermarket in Phoenixville, Pa. The incandescent lamps were selected for their appropriate and ideal color quality of illumination for the inspection and accurate visual evaluation of groceries, meats, produce, canned and packaged goods and sundry items sold in this store. Their color quality also creates a pleasant and visually comfortable store interior in which to shop.

The main sales area of this store embraces 7900 sq ft. The basic lighting system consists of 500-watt inside frost lamps in Holophane prismatic glass reflectors, installed on 10-ft centers. The ceiling height is 15 ft, and these reflectors are

recessed flush in the ceiling. The sales area is enclosed on three sides by floor-to-ceiling walls, and on the front by an all-glass window. Customers can therefore view the entire sales area as they approach the front entrance from the exterior.

Wall display cases extend along the three interior opaque walls. These cases are lighted by a continuous luminous valance, which directs light downward to the displays and upward to light the upper wall surfaces above the cases. The valance consists of a continuous white plastic diffuser held vertically which shields 96T12 cool white fluorescent lamps mounted end-to-end on Metalcraft channel strips, and operated at 430 ma. This lighted plastic adds a decorative touch, and gives an illusion of a larger interior. The fluorescent light flux is small in

proportion to the incandescent, and changes the spectral quality of the general illumination very little.

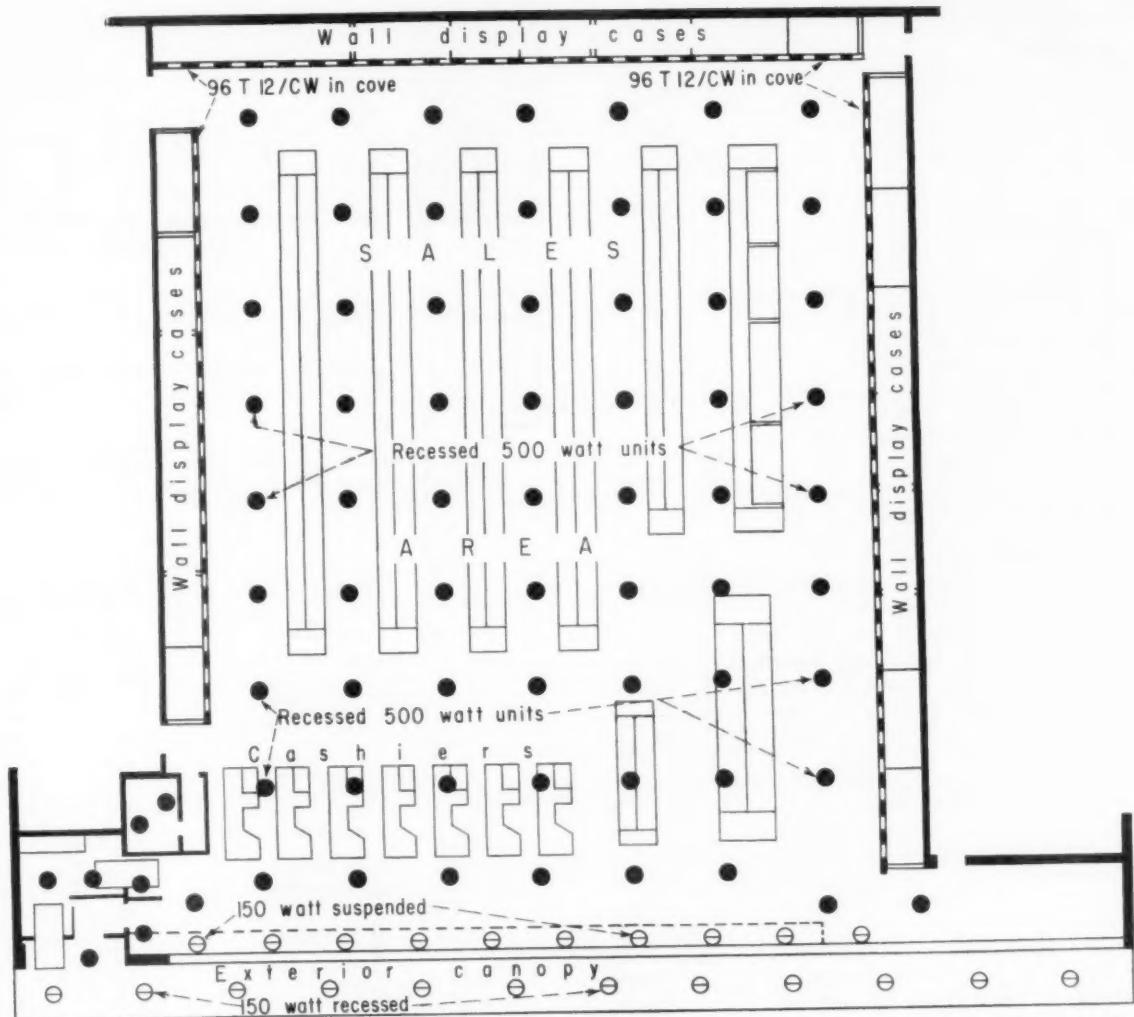
A canopy over the front window wall contains 150-watt R40 lamps recessed, which lights the sidewalk and entrance. Similar lamps in swivel housings inside the store light the show window display area.

The lighting system design for this store is efficient, easy to maintain, and presents an unusually clean and attractive interior appearance. It is visually comfortable, and highlights the merchandise displays for accurate and quick selection of purchases. It was planned by A. J. Hasson, the electrical contractor, of Phoenixville, Pa., in co-operation with Arthur V. Schafer, lighting application engineer for Philadelphia Electric Co., Philadelphia, Pa.

MARKET



LIGHT attracts shoppers to Jerry's Supermarket, Phoenixville, Pa., by silhouetting an attractive sign over the store, and by highlighting the merchandise displays so they can be seen easily through the all-glass store front.



PLAN of lighting layout shows 500-watt incandescent units on 10-ft centers, with luminous valance using 96T12 cool white fluorescent lamps located 4 ft in from wall on three sides of store. Recessed 150-watt R40 lamps in exterior canopy light sidewalk outside store.

Fluorescents and Incandescents Provide



FLEXIBLE LIGHTING FOR COMFORTABLE LIVING

DIVISION

Electrical Contractors

CLASSIFICATION

Residential Lighting

AWARD

First Prize

PROJECT

Electri-Living Home
Greensboro, N. C.

WINNER

S. S. Snyder
Snyder Electric Service
Greensboro, N. C.

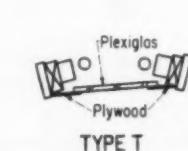
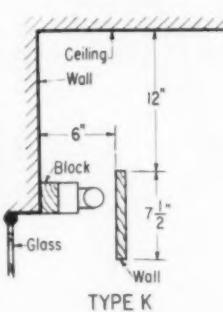
LIHTING is a star feature of the 5-star Electri-Living Home, Greensboro, N. C., completed and opened for show and sale early last fall. Other star features are a heat pump, an all-electric kitchen, an all-electric laundry, and full house-power (200-amp capacity service entrance panel—26 circuits).

The lighting plan embraces both fluorescent and incandescent lighting equipment (see plan at right), with each area of the house lighted by permanently installed luminaires or built-in equipment. In general, dimmer-controlled fluorescent valance lighting provides general low level background light, and incandescent units add accent lighting. Valance and soffit lighting uses fluorescent strip units. Ceiling units in bathrooms, hallway, kitchen and study are standard Virden equipment. Exterior floodlights are installed at corners of the house and can be low-voltage controlled from the master bedroom. Details of special built-in units are shown at right.

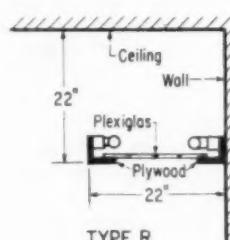
The lighting for this house was planned by lighting engineers of the Duke Power Company, supplied by Johannessen Electric Co., and installed by Snyder Electric Service, all of Greensboro, N. C.



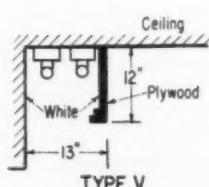
LIGHTING is a dramatic part of the electrical features in the 5-Star Electri-Living Home, Greensboro, N. C. Special fluorescent units provide overall general lighting, while standard incandescent units add dramatic highlights.



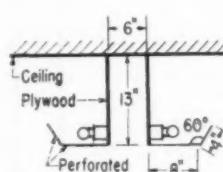
SPECIAL DESIGNS for lighting units use standard lighting components, are generally of the built-in and recessed types.



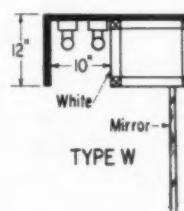
TYPE R



TYPE V



TYPE S



TYPE W



800-ma Lamps Provide

GENERAL LIGHTING FOR INSPECTION

DIVISION

Electrical Contractors

CLASSIFICATION

Industrial Lighting

AWARD

First Prize

PROJECT

Precision Tube Co.

North Wales, Pa.

WINNERS

A. Walker

Union Electric Co.

Philadelphia, Pa.

George Swint

Precision Tube Co.

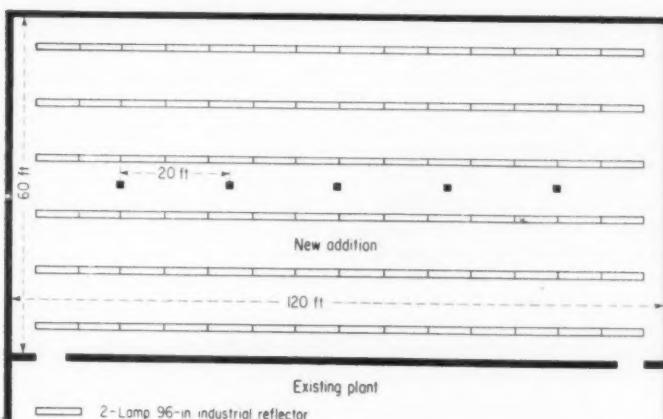
North Wales, Pa.



INSPECTION area in new addition to Precision Tube Company plant, North Wales, Pa., is lighted to a general level of illumination of 75 footcandles throughout. Reflectors have a 10% upward light component.

A GENERAL lighting system, which produces an intensity of 75 footcandles of quality illumination throughout, was selected to light the new 7200-sq-ft inspection area of the Precision Tube Co., North Wales, Pa. This makes it possible to visually inspect the company's product, drawn metal tubing, at any of the locations that are determined by the size and length of the finished product.

The lighting system consists of six rows of 14 2-lamp 96T12 800 ma DayBrite industrial reflectors per row, installed 10 ft on centers and 14 ft above the floor. The reflectors are of the open top type, which permits a 10% upward component of light. This feature lights the ceiling above the reflectors softly to reduce brightness contrasts, and also keeps the fixture ventilated so that the lamps operate cooler than if enclosed, and reduces the accumulation of dust and dirt on the lamps and reflector surfaces. Use of 800-ma cool white lamps makes possible the higher footcandle level with a minimum



SIX ROWS of 14 2-lamp industrial open-top reflectors per row, installed end-to-end and 14 feet above floor, light the entire 7200-sq ft inspection area uniformly. Ceiling is softly lighted by upward lighting.

number of reflector units.

The lighting layout and equipment selection was made by A. Walker of Union Electric Co., and George Swint, plant electrical engineer, in cooperation with Arthur V.

Schafer, lighting applications engineer with the Philadelphia Electric Co. The installation and all electric work was performed by the Union Electric Co., electrical contractors of Philadelphia, Pa.

Operating Costs—Factors Affecting Project Overhead

By Ray Ashley, Research and Consulting Engineer, Oak Park, Ill.

QUESTION:

What are the three principal factors which affect project overhead?

ANSWER:

Principal factors affecting project overhead are:

1. *Size of project*
2. *Nature of the work*
3. *Method of Billing.*

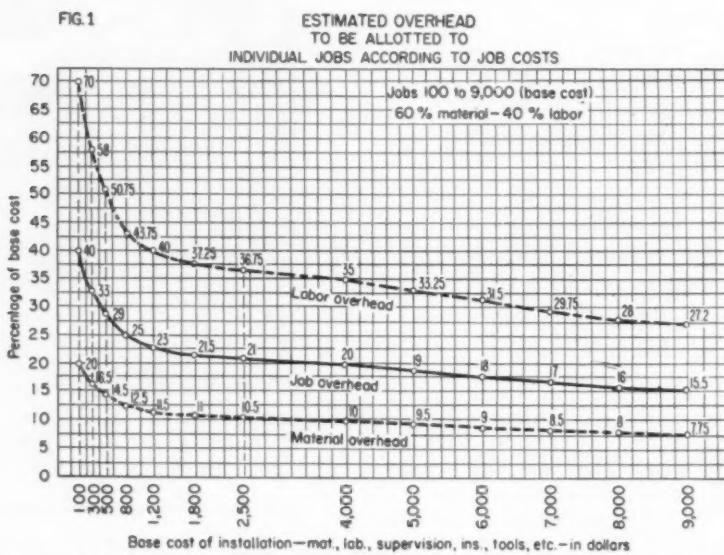


FIG. 1—Overhead decreases as the size of the project increases. Curves show fairly rapid drop in overhead percentages for jobs ranging from \$100 to \$1,000 base cost.

DISCUSSION:

SIZE OF THE PROJECT. All other things being equal, overhead costs decrease as the magnitude of the project increases. Principally, this is due to the contractor's ability to handle a much greater volume of business if the contracts are for large amounts. A glance at the research overhead curves of Fig. 1 verifies the reduction of overhead as the job size increases. These curves also verify the logical assumption that it costs less to install one \$10,000 project than to handle five separate \$2,000 jobs.

Also, direct job expenses, such as engineering, supervision and tools are *proportionately* less for large projects. Since such expenses influence overhead costs, the latter will be smaller for large installations.

NATURE OF THE WORK. Operating costs are greater for complicated installations than they are for the simpler types of work. For example, a hospital installation, with all of its signal systems, air conditioning controls and numerous small rooms, is much more involved than a simple installation of power feeders.

Alteration work is another type which carries higher operating costs. Comparison of percentages in Fig. 2 shows the cost of handling material and labor on such projects to be higher than that for industrial or commercial installations.

Generally speaking, complicated work has a tendency to reduce volume. This, in turn, increases overhead. Also, there are increased di-

rect job expenses which indirectly cause an increase in overhead.

METHOD OF BILLING. On many large projects, the book-keeper, procurement agent, engineers, and others comprising a complete construction organization are located at the job site and devote their entire time to the specific project. Their salaries, and all expenses identified with the project, are billed as direct job costs. This billing method shifts much of the expense, normally included in overhead, directly to the job. The home office provides little besides setting up the job organization and some necessary overall supervision.

Next, in this series, will be an outline of direct job expenses applicable to material, labor, and a combination of both.

DIVISION OF OPERATING COSTS FOR ELECTRICAL INSTALLATIONS SHOWN IN PERCENTAGE OF COSTS OF MATERIAL AND LABOR

FIG. 2—Operating cost chart illustrates the effects of different types of construction. Compare Column 7 (industrial work) cost of handling material—5.72%; and supplying labor—20.9% with Column 25 (alteration work) figures of 10.54% for material and 36.65% for labor.



FRIDAY, 1:00 PM — Rock Island Millwork Co. A frame used with chain fall hoist to lift motor from basement of Rock Island Millwork Co. The 125-hp, 3-phase, 440-volt motor operates a hammer-mill that grinds up large pieces of wood.

LARGE MOTOR REWINDING

Rewinding 125-hp, 3-phase, 440-volt motor to 150 hp in 68 hours.
Time sequence story of a Torrance Electric Motor Shop job in Rock Island, Ill.

By W. J. Martens

WHEN contacted by one of their customers in regard to the price of a new 150-hp, 3-phase, 440-volt motor to replace a present 125-hp motor that was being daily overloaded because of increased production in their plant, Torrance Electric's brains went to work. Here are the problems that arose. If they sold them a new motor what allowance could they give for the old motor? Could the old motor be rewound? If so, how long would it take? And could the plant's production stand being without the motor for the length of time that would be needed to rewind it? Would the cost of rewinding be less than the cost of a new motor? Because of their normal around the clock operation could they rewind the motor over a week-end?

Remembering that the motor was in their shop about a year ago for some repairs, they consulted their inactive files. Here they found the stator-core dimensions and other data taken down at that time. From this information they determined that it was possible to rewind the motor to 150 hp. Now the cost and the amount of time needed to do the job had to be considered. The selling cost of a new 150-hp motor was around \$2,681, plus the additional expense of installing a new motor, which no doubt would have different size mounting base and different size shaft. A check

was made with the workmen in the shop, to see if they could rewind the motor in 72 hours. The answer was yes, meaning that different groups of workmen would have to coordinate their efforts so that the electrical parts of the motor and the mechanical parts of the motor would be worked on simultaneously. After a considerable amount of figuring, a price of \$1,178 was arrived at, including taking the motor out and reinstalling it.

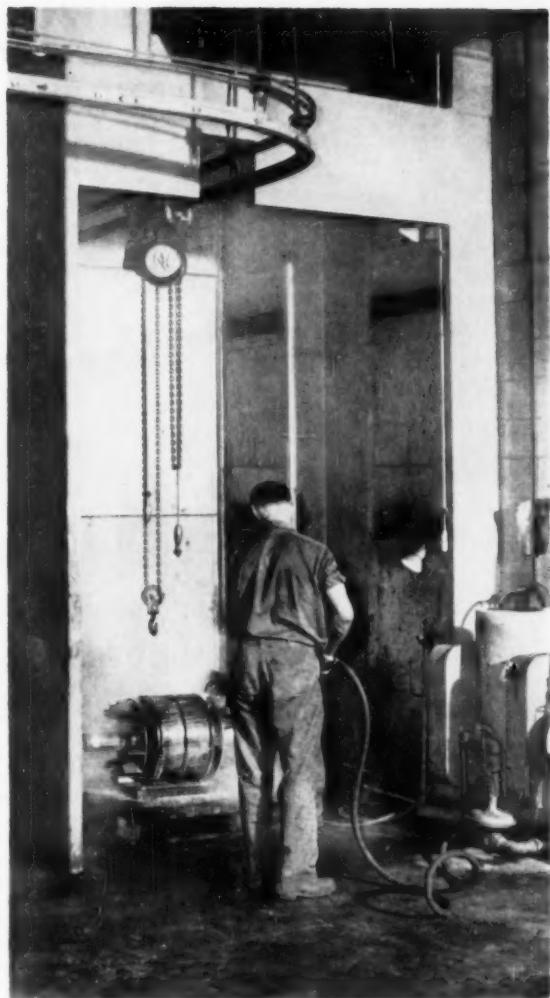
When the quote for the new motor was presented to the customer, Torrance Electric also sent along the following quote for rewinding the 125-hp motor: "Rewind 125-hp, 3-phase, 440-volt motor to 150 hp, 3-phase 440-volt that will develop 1160 rpm, and not to exceed the price of \$1,178. This will include taking the motor out of your plant Friday noon August 23, and have it back in your plant and running at 8 o'clock Monday morning August 26." Needless to say, the customer chose the rewinding job.

By working three shifts around the clock, employing all the shop's modern facilities (including 50 fc of lighting throughout entire area, 400 ft of electrified monorail, 160-ft bridge crane, 180 ft of roller conveyor, plus the most modern equipment available) and by Torrance's operation set-up and know-how—this was accomplished. Here is the story in pictures.

FRIDAY, 2:30 PM—Receiving Dept. Disassembling motor and removing rotor from stator. The device constructed by Torrance Electric for this operation is a heavy steel bar 1 in. by 3 in., welded into a U shape. One leg of the U features a steel cylinder. Inserted into this cylinder is a steel sleeve that matches the shaft of the motor. Torrance has a number of these sleeves on hand to fit any size shaft. The leg opposite the one with the attached cylinder has a number of 1-in. holes bored into it. After the proper sleeve is selected and the cylinder is fitted over the shaft, a bolt is placed in the proper hole on the top bar. A hoisting device lifts the rotor until it is in balance, and it is removed without dragging on the stator. This rotor removing device is used in connection with a chain-fall that rides on a dolly connected to an overhead I-beam. This method is also used to re-install the rotor.



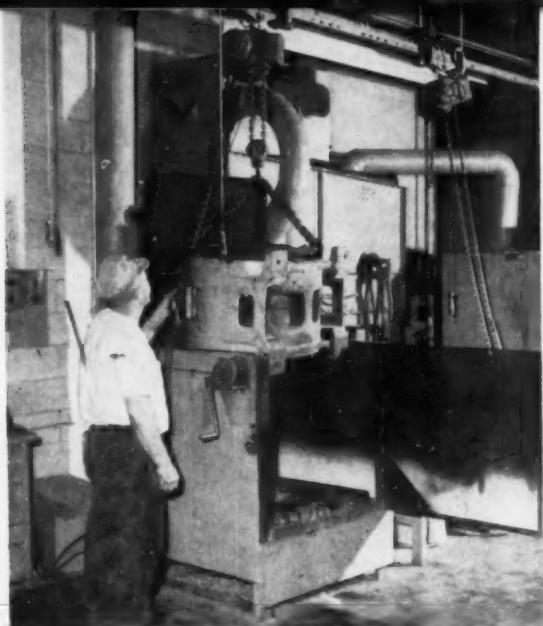
FRIDAY, 5:00 PM—Disassembling Dept. Workman is shown cutting stator coils with an air-driven chipping hammer. He cuts the end opposite the lead end prior to burning. After the stator has been burned, the coils can easily be pulled out of the slots from the end opposite the one that had been cut. At this time the windings in all stators are checked and recorded to make sure correct windings are reinstalled.



FRIDAY, 5:30 PM—Disassembling Dept. Steam cleaning booth is used to clean the rotor. While this is happening, the stator is also being processed. Also simultaneously, the mechanical parts of the motor are being worked on.



FRIDAY, 5:55 PM—Disassembling Dept. Sand-steam cleaning, rotor travels overhead via monorail to a gas-fired drying oven. The automatically controlled oven temperature is 220°.



FRIDAY, 7:30 PM—Disassembling Dept. Monorail is shown here lifting stator into burn-out oven. The furnace's burning time is automatically controlled by electric timer on gas valve. Ratchet handle raises lid on oven to set large stators in from the top.



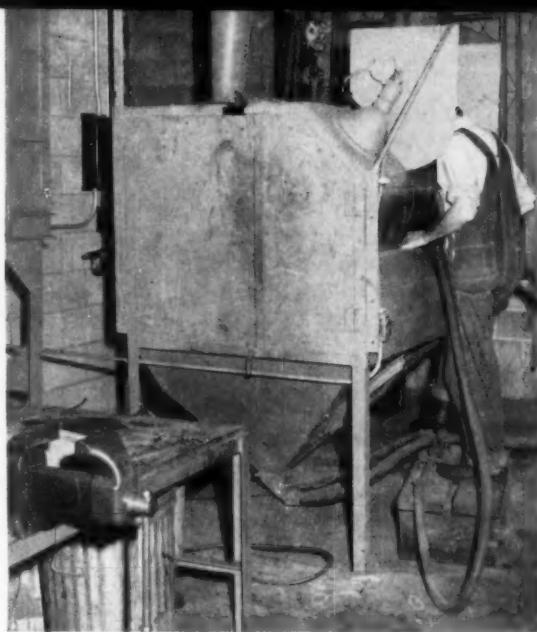
FRIDAY, 11:30 PM—Winding Dept. While stator is being sand-blasted, the motor winder sets up the winding machine and makes the coils out of glass-insulated wires. The magnet wire spools to be used are located on multi-frame rack 8 ft by 12 ft by 4 ft in such a way that the wire can be fed from the spools through $\frac{1}{2}$ in. by 3 in. fiber bushings above each spool to master panel. Master panel, measuring 8 in. by 16 in. by 1 in., is attached to angle-iron frame bolted to floor. Fitted into the board are $\frac{1}{2}$ -in. by 3-in. fiber bushings, the same as found on multi-frame rack. Below each of these bushings is a number telling its wire size and corresponding to number on spool rack. A second unit, which is portable, contains the glass-insulated wires the workman is using. Because glass-insulated wires do not de-reel from spools on large rack easily, they are dispersed from this portable de-reeler.



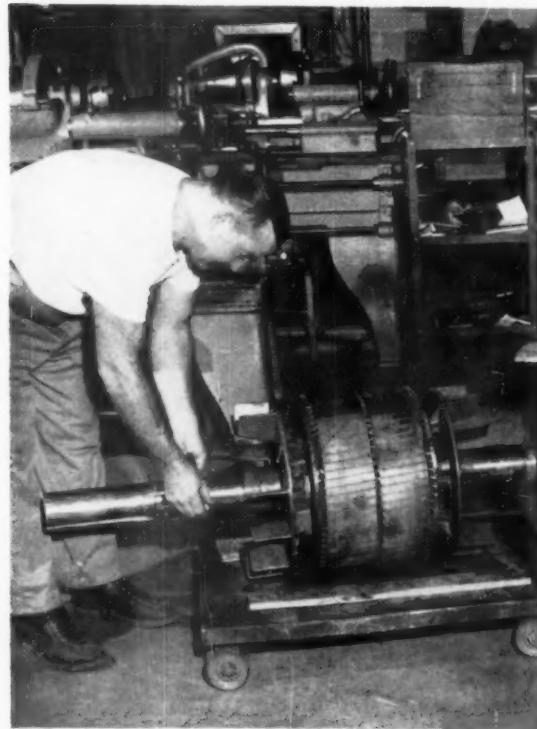
SATURDAY, 2:00 AM—Winding Dept. The glass slot insulation has been inserted and coils are being installed. 1-in. pipe stand with heavy base holds mush-wound coils for installation in stator. A 30-in. by 30-in. portable steel bench holds stator while workmen install coils. This area as well as the entire shop features 50 fc of shadowless lighting. Adjustable metal table in background is used for connecting coils. (Right) Close-up of partially wound stator illustrates the use of glass wire laid in a slot which is first insulated with glass slot insulation. A second piece of glass feeder is inserted in the slot and the coil is laid in it and the glass cloth is folded over and around it. The glass feeder which is wrapped around the coil extends beyond the glass cloth insulation $\frac{1}{2}$ in. The ends of the coils are insulated from each other with a piece of glass cloth, and two pieces of glass cloth are placed between the phases. Most windings fail where coil comes out of the slot.



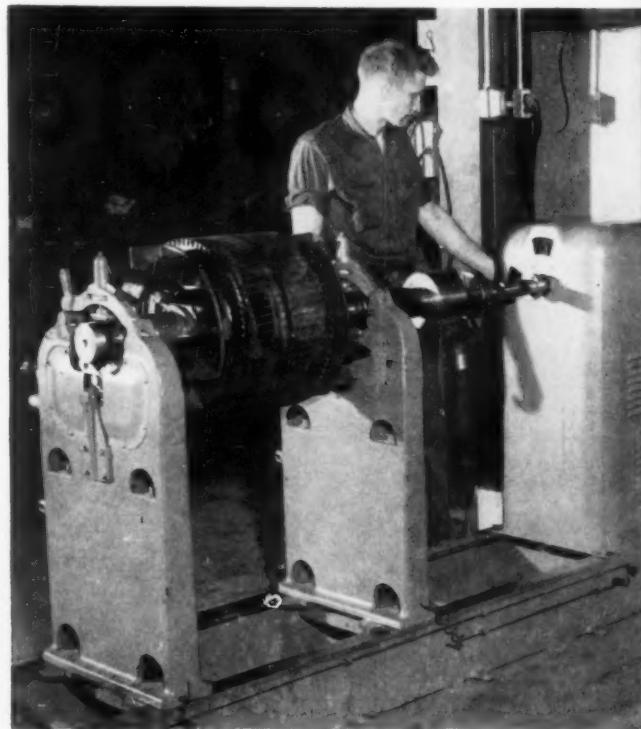
FRIDAY, 10:30 PM —Disassembling Dept. Workman pictured here is measuring the stator so he can set up the winding machine. The motor will proceed from here via monorail to sand-blasting area located away from motor winding department.



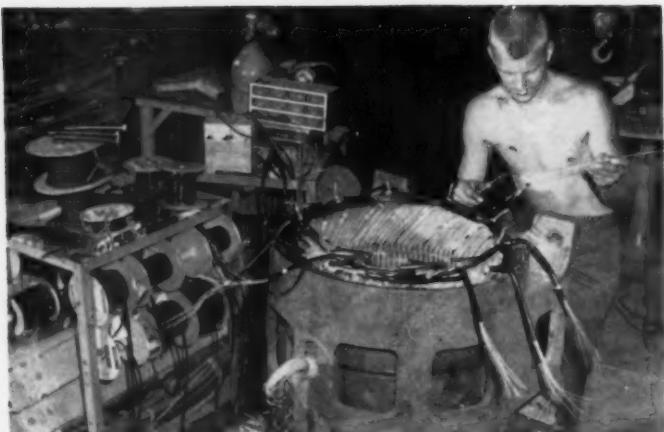
FRIDAY, 11:00 PM —Disassembling Dept. Sand-blasting stator. Monorail runs over top of large tank to deliver stators to it. Doors at each end of it provide in and out feature. Fast and efficient removal of dirt and grease is accomplished by sand blasting.



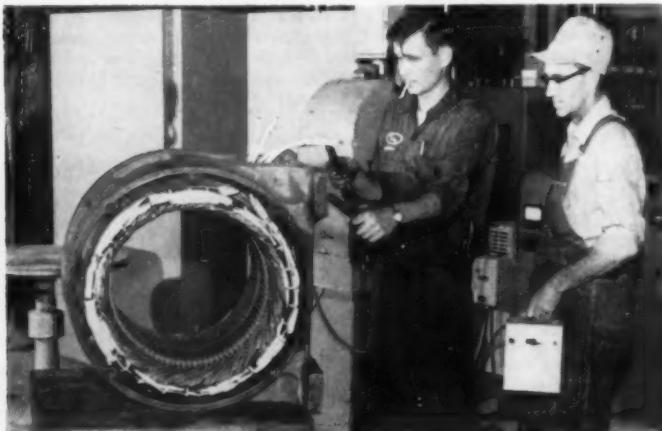
SATURDAY, 8:00 AM —Machine Shop Machinist is shown here checking to make sure that bearings fit properly and shaft is straight. He also makes sure that keyways are not damaged. The machine shop area is completely covered by bridge crane which is interlocked to monorail system. The rotor leaves here and proceeds to balancing machine.



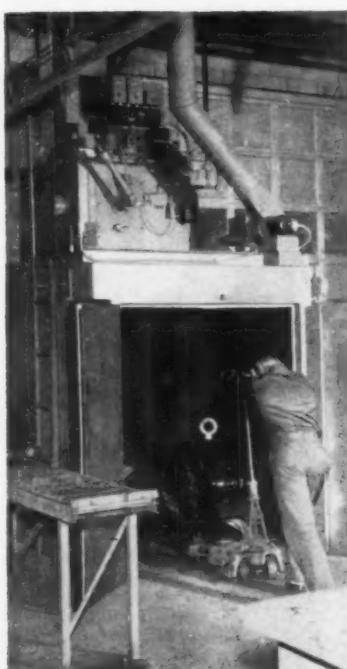
SATURDAY, 11:00 AM —Assembly Dept. Dynamic balancing machine. Workman is checking the balance of the rotor on a balancer. The idea for the drive mechanism was a joint effort of Bear Manufacturing, Reliance Electric and Engineering Co., and Torrance Electric Co. The machine is driven by electronic Reliance V-S junior drive providing an infinite speed control that is absolutely uniform. It will balance a rotor at the speed that it will be used.



SATURDAY, 10:00 PM—Winding Dept. Connecting the windings on the stator. Portable welded steel bench holds stator while four-wheeled cart carries all connecting supplies plus glass sleeving insulation. Second portable cart holds all welding supplies for welding the connections.



SUNDAY, 12:30 AM—Winding Dept. Hy-Potting the windings for one minute with a voltage equal to twice the line voltage of the motor plus one thousand volts.



SUNDAY, 12:30 AM—Winding Dept. Motor is given spin test and checked for continuity and connections.

SUNDAY, 1:30 AM

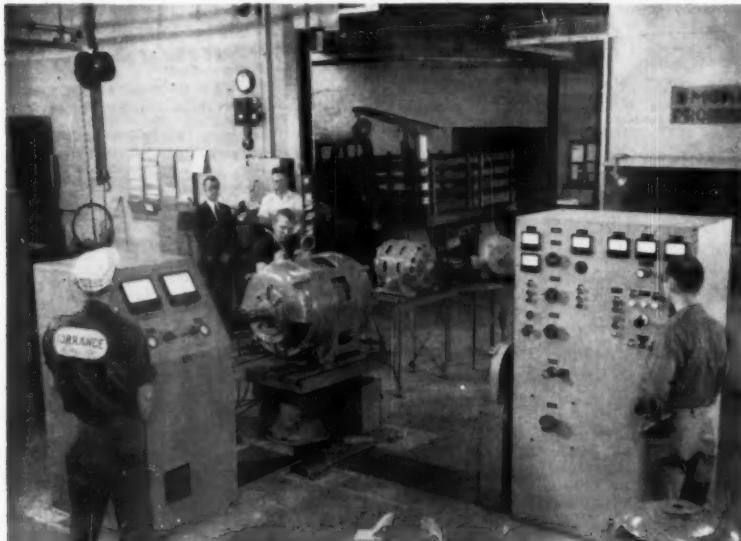
—Winding Dept. After the stator has been pre-heated in the baking oven, it is dipped into 6-ft by 4-ft by 3-ft tank containing clear synthetic baking varnish. Operation began at 1:30 A.M. Sunday morning when it was pre-heated for one hour until 2:30 AM, dipped again for one-half hour until 3:00 AM, baked for five hours until 8:00 AM, dipped for one-half hour until 8:30 AM, baked again for five hours until 1:30 PM, and given final bake for six hours until 8:00 PM.



SUNDAY, 8:30 PM—Assembly Dept. Varnish is removed from the iron in the stator with a wire brush attached to an electric grinder and is removed from the machine surface with a sharpened file.



SUNDAY, 11:00 PM—Assembly Dept. After the motor is assembled, it is spray painted with a very high grade of gray enamel. The paint spray gun hangs on a lever on the side of the paint booth. When workman picks up spray gun, floodlights turn on and exhaust fan starts.



SUNDAY, 11:45 PM—Assembling Dept. Load testing the motor for six hours. The testing facilities at Torrance include a 200-hp reduced voltage starter; a large bank of resistors that are wall-mounted to be used in the secondary on a wound rotor motor; a rectifier which will give 300 amps at any voltage from 6 to 250; a dynamometer that will load any motor up to 200 hp; and a transformer which will transform 440-volt power to 2300-volt power. The entire testing set-up is controlled through the panel that you see at the right side of the picture. The right side of the control panel is for ac motors and the left side for dc motors. The three instruments in the upper right hand side of the panel indicate amperage per phase. The man in the center of the photo is checking the temperature of the stator, while the man on the left is watching two instruments, one indicating that the motor is developing 150 hp and the other that the motor is running at 1160 RPM. The dynamometer will impose a load up to 200 hp.



MONDAY, 6:45 AM—Rock Island Millwork Co. After running the motor on a continuous heat run for six hours, the motor is taken back to the plant and re-installed.



MONDAY, 7:45 AM—Rock Island Millwork Co. The motor is installed and the current per phase is checked as part of Torrance Electric's follow-up procedure.

**Two decades of experience
in the lighting field
guarantee quality service of . . .**

1700 Maintenance Contracts

Radio-equipped trucks, contract incentives, 24-hour emergency operation, time-tested methods and equipment, practical promotion approaches and a productive fabrication shop are features of an active, king-sized maintenance organization on the west coast.

By Benn J. Hartmann, Vice President, Flood-Lite Service, Inc., Los Angeles, Calif.

IT IS encouraging to note a steady upward trend in the "light consciousness" of the general public. Evidently the industry's various educational and promotional campaigns are finally producing results, for today the average merchant or industrialist rarely argues against the oft-stated benefits of high-quality-and-quantity illumination. Improved appearance of premises, better employee morale, higher efficiency of workers, fewer errors or rejects, fewer accidents and the like are statements which have finally been driven home through the process of repetition. In fact, many moguls of management also subscribe to the related truism that at least *some* form of so-called "maintenance" should be practiced in order to keep dirt from lowering the "eye appeal" of merchandise, from detracting from an otherwise-pleasing environment, or from reducing the equivalent output of electric current by blanketing light which is being paid for and produced within a lamp, but which is not "coming through".

So far, so good. All too frequently, however, the responsibility for this so-called maintenance is placed in the hands of a handyman or janitorial department having the vague conception that "maintenance" merely means cleaning and relamping fixtures on a "spare time" basis "when needed". Perhaps we should agree that this form of housekeeping is better than none at all, yet it should be fairly obvious that a well-designed and expensive lighting installation cannot possibly give the consistent, safe, economical and satisfactory service for which it was planned if maintenance personnel do not have proper replacement parts and cleaning equipment, prescribed instruments and meters for testing and adjusting, or essential "know-how" and techniques.

This obvious argument is an effective selling point for an organization such as ours, and we have obtained numerous clients who appreciate such logic as: (1) Scheduled inspections, testing, cleaning and relamping of fixtures keeps defective components from ad-

versely affecting the efficiency of an entire lighting system. (2) Systematic checking of fixture performance and light output detects and corrects minor irregularities before they result in outages or serious annoyances. (3) Unexpected charges are eliminated because fixed monthly bills guarantee replacement of parts and lamps as needed. (4) Inventory worries are nonexistent, since all required components are carried in stock by us. (5) This elimination of inventory likewise negates loss of parts through fire, theft or breakage; insures constant quality, color, characteristics and performance of the lighting system; eliminates invested capital and the necessity for shopping for parts when required. (6) Maintenance work performed by trained men insures complete, reliable and safe service; protecting both men and equipment since all laws and recommendations of insurance, jurisdictional and code authorities are thoroughly understood and conscientiously practiced. (7) With all lighting main-



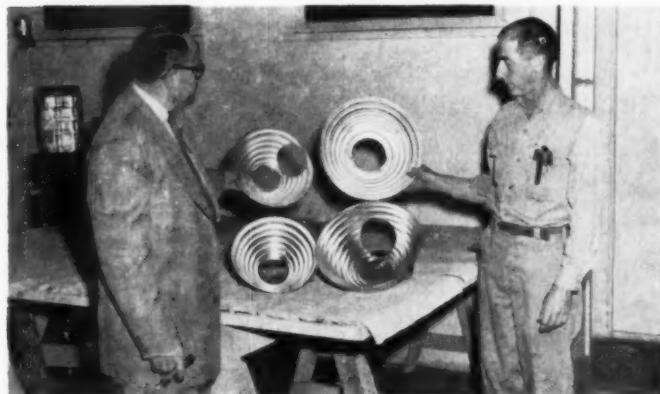
ALL NEON TUBING atop this drive-in eating spot was formed and installed by Flood-Lite men, after which the entire lighting installation was placed on contract for periodic inspection, cleaning, replacement of faulty or aging components. At present, neon tube installations maintained by us approximate 325 separate jobs, constituting about 20% of the total number of contracts which we currently hold.

tenance performed automatically by an outside contractor, plant employees can concentrate on details more directly related to production and operation of plant equipment. (8) Liability worries are eliminated because (a) all reputable maintenance companies carry compensation policies and (b) workers who have continuous experience with glassware, ladders, scaffolding, wiring and the like are generally more safety-conscious than those who perform this type of work only occasionally.

These various points are some of the arguments which we have been stressing for over two decades, and their effectiveness may be emphasized by the fact that these beliefs (which we have religiously practiced) have helped materially in promoting the 1700 maintenance contracts which we presently hold. Of this number, it may be of interest to note that about 875 concern floodlighting, 475 cover interior installations, while approximately 325 relate to neon. In the first two of these categories, fluorescent main-



OUR LOS ANGELES headquarters is dramatically outlined at night by back-lighted silhouette lettering atop the building, plus floodlighting of four recessed structural bays. Floodlighting mediums consist of R-lamp clusters positioned at ground level close to wall lines. Since many of our customers (such as gas stations and some markets) remain open all night, our service department can be summoned for emergency work all hours, seven days a week.



ALUMINUM INTERREFLECTORS, made and patented by us, are placed behind floodlight lamps each month as a standard maintenance routine. The interreflectors which are replaced by this process are then returned to the shop for refinishing and reinstallation in other floodlights at later dates. Variety of shapes, sizes and positions of collar openings permit us to follow this practice in servicing a wide range of standard floodlight luminaires. Added shop costs are minor compared to savings in on-the-job labor, while customer satisfaction is another positive "plus value."

TUBULAR LETTERS and shapes for neon signs are formed in our own shop, then are gas-filled, equipped with terminal fittings and installed by Flood-Lite crews. Where maintenance contracts for periodic service are also held by our organization, complete responsibility for guarantees and performance are centered in a single company, thereby eliminating partial responsibility and intermediate price markup of a middleman.





ISLAND CANOPIES of similar design but with varying details are installed in this service station, the nearest unit being a 2-column 15½-ft-long assembly equipped with two circlines and a dozen 6-ft slimline lamps. The rear unit is a single-column 11½-ft assembly with six 8-ft slimlines and a cluster of reflector spotlamps mounted atop the left end. Units, made by us, are delivered as complete prewired "packages" to minimize installation times and costs, while smooth and highly-reflective (85% RF) enameled surfaces facilitate maintenance for constant high-level low-glare illumination.

tenance exceeds incandescent by nearly 5-to-1, the actual lamp totals being approximately 98,000-to-20,000. These jobs are mainly concentrated in southern California (where we have five of our seven offices), while the remainder are handled through our offices in Chicago and Houston.

Incentives for Promotion

Our actual mediums of sales promotion are several, for we have nine salesmen who constantly call upon prospective customers; we ad-

vertise in the "yellow pages" of the phone book; we do a fair amount of direct-mail advertising; and we have an incentive bonus system which prompts all of our service men to "preach the gospel" of lighting maintenance to all with whom they come in contact. Under this incentive plan, a service man who becomes instrumental in obtaining a new contract would receive the entire first month's billing as a bonus in recognition of his efforts, and this incentive also prompts them to constantly "practice what they preach".

It is also of interest to note that, even in buildings where nothing is "sold" in the conventional sense, managers are still willing to employ good lighting as an agent for promoting good public relations. For example, one of the larger buildings which we maintain (the nationally-publicized Prudential office on Wilshire Blvd.) keeps floodlighting units on until midnight, and keeps the outer perimeter of fluorescent lights (from the third floor up to the roof) on until 1:00 am.

This practice came about through general expressions of public reaction, for, when lights were previously turned off earlier in the evening, after janitors had completed their cleaning chores, numerous letters were received by Prudential officials, the letters all varying the consensus that "the lighting looks good" . . . "we like it" . . . "leave it on".

As a result, approximately 2600 periphery lamps (about 2 miles in overall length) are kept on for the extra hour. Operating these lights, plus the floodlighting, for the extended periods costs an additional \$8.10 an evening or \$245 a month. This may sound like a lot of light and a lot of money, yet Prudential officials are aware that a single well-placed illuminated billboard would cost \$900 a month and would be seen by only a relatively few motorists. By comparison, their illuminated building can be seen halfway across the city on a clear evening; it has become a familiar landmark and conversation-piece.



LIGHTWEIGHT ALUMINUM canopies for service station island lighting units are spray-enamored to harmonize with any color scheme specified by the customer, then are baked to a hard smooth finish by banks of infrared lamps. Although canopies are made in three sizes, all units are equipped with three pre-wired capped outlets for R-lamp clusters.



LARGE INVENTORY of all standard types of lamps, from power-grooves to T-5s, plus complete assortment of ballasts, starters, sockets, wire, tools, meters and instruments, are readily available in our stockroom, where crew foremen can draw needed materials and equipment in accordance with the requirements of their daily maintenance assignments.

And, on a "cost per impression basis", the added expenditure is negligible.

Incidentally, this total lighting installation includes over 13,000 lamps, and the maintenance assignment is a full-time function for one of our smaller crews. The size of the job also justifies the creation and use of special equipment designed for this specific installation, such as the special cart which is pictured in an accompanying illustration.

Service on Wheels

Since lighting maintenance is a service function which must be performed on customers' premises rather than in a central shop, an efficient maintenance organization must have considerable portable equipment and stock to facilitate this mobile service requirement. For that reason we have a fleet of well-stocked well-equipped vehicles. The fleet operating from our Los Angeles headquarters alone consists of 45 "routine service" trucks, plus an additional dozen stock, delivery, boom-rigged and other-purpose vehicles.

All routine service trucks are equipped for all types of lighting maintenance. That is, for interior and exterior jobs alike; commercial, industrial, institutional and so on; "conventional" installations plus floodlighting and signs; mercury-vapor, incandescent, fluorescent and neon. This suggests the extent and variety of equipment which these trucks must carry, for contents include reasonable supplies of all standard lamps, ballasts and starters, wire, sockets and similarly-classed components. The trucks also carry cleaning equipment ranging from detergents to chamois cloths, high-level working mediums ranging from aluminum ladders to scaffolding, maintenance accessories ranging from dipping tanks to steam generators and nozzles, protective drop cloths and tar-paulins, plus an assortment of meters and instruments, power- and hand-tools.

In addition, all trucks have 2-way radios. These are not radio-phones connected to our home office through telephone-company central-station equipment, but are direct-contact communication links that operate through our own company-operated receiving and transmitting station.

The economy of this radio instal-



TRANSLUCENT PLASTIC ceiling installations, like all other jobs which we service on a contract basis, are inspected at least once a month, cleaned periodically and, in most cases, relamped on a group basis before performance curves of lamps begin to materially drop off. Panels are cleaned with a detergent, rinsed and destaticized.



MOBILE CART was designed specifically for one of the larger contracts, with built-in safety-tread ladder and bins to hold lamps and components used on this job. Cart is rubber castered and buffered to prevent marring of floors and walls and is dimensioned to pass freely through all doorways and elevator entrances.



GENERAL OFFICE area is well-lighted, air conditioned and equipped with modern business machines to promote efficiency and morale of employees. Other modern trends include luminous ceilings in private offices, company-leased 2-way radio station for contacting service crews, addressograph plate and stamping machines, musical transcription in shop areas.

lation can quickly be appreciated when one considers that each of our 45 truck drivers contacts the office about four times a day on the average. Without radio this would mean seeking a parking spot (which can be quite a task in a crowded metropolitan district like Los Angeles), then seeking a public phone and finally speaking with the home-

office dispatcher. This (conservatively) would be a repeated 15-minutes-per-call practice which would result in each driver, and truck, being non-productively occupied for an hour a day. Multiplying this base estimate by 45 trucks indicates that conventional phone communication could easily amount to at least \$100 a day.



SHEET METAL SHOP, where three-dimensional sign lettering is fabricated, is equipped with travelling hoists, electric welding machine, presses, shears and all similarly-related equipment. Ample stock of materials is kept constantly on hand to eliminate delays in fulfilling all types of orders received by this department.



TYPICAL LUMINOUS CEILING installation has slimline lamps mounted on 2-ft centers above corrugated plastic diffusing panels which are cleaned periodically by progressively immersing them in three tanks respectively containing detergent, rinsing water and a destaticizing agent. This particular installation covers 4200 sq ft; is illuminated by 180 8-ft T-12 lamps; constitutes a loading of 3.9 w/sf; has a utilization coefficient of 59% and a maintained lighting level of 70 footcandles on desk tops.

Since leasing a radio station for our sole use costs considerably less than this amount, we believe that this is an investment of tangible value. Furthermore, since the private cars of the owner-partners (President Harold Freeman and myself) are similarly radio-equipped, it is possible for us to contact the office from any part of the city without delay, or monitor conversations between drivers and office dispatcher to keep advised concerning progress and problems of our various crews.

Our typical "routine job" crew consists of one mechanic and one helper, although special crews are

assembled for special assignments. Special jobs likewise have the service of special equipment (such as our boom-rigged truck for signs and elevated exterior work), or they are provided with special lamps (power groove, T-5s, etc.). Since all of these various requisites are initially listed on our contract forms and are therefore known to our crew-dispatcher, it is extremely rare when a crew encounters unexpected problems or item requirements after they have reached a jobsite.

On the related subjects of trucks and radios, it is pertinent to include the statement that, since many of

our customers are open all night and over weekends (such as gas stations and some markets), we maintain emergency service on a 24-hour 7-day-week schedule. As previously mentioned, all standard lighting components and cleaning equipment is contained in each truck as a "mobile nucleus" for all normal work, while "key" personnel can be reached at all hours if it becomes essential to obtain additional special items from our stockroom or shop.

One of our standard practices in servicing floodlight installations is to install auxiliary spun-aluminum interreflectors (on which we hold a patent) behind each lamp each month. These interreflectors are made in our own shop, and, as they are replaced in this monthly practice, they are returned to the shop, completely refinished to restore their original reflectance value, replaced in stock and, subsequently, reinstalled in other similar floodlights on a rotational basis.

These interreflectors are made in a variety of shapes and sizes to fit a wide range of standard floodlight luminaires, and we have found that the cost related to the fabrication and refinishing of these replaceable items is more than offset by reductions in service time resulting from their use. Moreover, light output of floodlights remains at a maximum level, appearance is generally improved, and customers have expressed high satisfaction.

Another lighting product which we make as well as service is an illuminated pump-island canopy designed for gasoline stations, constructed of rigid light-weight rust-proof aluminum, factory-enamored to harmonize with any desired color scheme, provided with removable panels to facilitate servicing or replacement of components, and furnished with guaranteed ballasts, sockets and auxiliary components. Prewired in strict accordance with all ETL, UL and NEC standards, these canopies are shipped as complete units which can be installed with a minimum amount of local labor, time and expense.

Three sizes of canopies are designed for either one- or two-column mounting, while a combination of cool-white circline and rapid-start slimline lamps operate at 800-milliamps to provide an abundance of illumination for pumps and approach ramps. Since undersides of canopies have uninterrupted sur-



MAILING AND BILLING is speeded through the use of addressograph stencil-cutting and printing machines. Numerous additional items of modern office equipment are likewise time-saving and efficiency-promoting, while use of 2-way radio between service dispatcher and drivers of all company vehicles eliminates countless delays for parking and phoning.

faces, and since these easily cleaned surfaces have a reflection factor of 85%, high levels of low-glare lighting can be maintained almost indefinitely.

Normally we pre-wire these units for 120-volt, 60-cycle power, although, if customers so request, other voltages and frequencies can be provided for at the time of assembly. Also, if customers desire additional lighting to accent specific areas or displays, clusters of R spot-lamps can be quickly mounted to any one of three capped (and pre-wired) outlets positioned along the top of the canopies.

A third major shop operation which we incorporate is the creation of neon signs. In this process we bend tubing, cap and exhaust the resulting formed letters and shapes, charge them with gas, install terminal cathodes and leads, and assemble and install them on the customers' premises. When manufacturing and installation are also combined with maintenance, the complete responsibility for performance is localized in a single organization, and maximum benefits are then obtained by the customer.

Policies and Standards

As to our overall policies, we guarantee to maintain all installations at least as high as 70% of their initial designed potential lighting output. We also inspect each job at least once a month to check on general operation as well as to check obtained illumination levels with the use of a light meter. For all large jobs we strongly ad-

vocate that lamps be replaced on a group basis rather than by the all-too-prevalent time-wasting method of replacing lamps one at a time when they either burn out completely or darken beyond the point of obvious efficiency.

These standards were established in the best interests of our customers. We believe, however, that these standards also enhance our own reputation in related fields. For example, since we are a multi-operation organization (consulting engineering, design, manufacturing and installation as well as maintenance) we believe that the quality of service which we render in any one of these fields of endeavor could influence the public's opinion of the company as a whole. Quite selfishly, we do not want the overall status of the organization jeopardized by shoddy maintenance work, so we advocate (1) careful planning to eliminate waste labor, (2) extensive use of modern tools, methods and equipment to do a better, faster job, (3) frequent field inspections to detect minor defects before they mushroom into major headaches for our customers as well as for ourselves, (4) the maintenance of a large and varied stock of replacement parts to insure prompt, exact delivery of desired items, (5) the use of simplified proposal forms and contracts to eliminate misunderstandings, and (6) standardized routines in filling out reports, time sheets and billing forms to minimize the possibility of errors.

Inasmuch as our maintenance work covers the complete scope of cleaning, relamping, replacement of

components, repair, installation of controls and wiring, our standard practices cover many interests. For example; metal louvered panels are cleaned by steam, whereas plastic panels and glassware are cleaned by progressively immersing them in tanks containing detergent, rinsing water and a destaticizing agent.

Time-saving methods are also evident in our offices, where mailing and billing is speeded through the use of our own addressograph machine, using stencil plates which have likewise been impressed by us.

Believing that a pleasant environment promotes efficiency as well as morale, we have acoustically tiled ceilings, have installed completely luminous canopies in private offices and continuous rows of suspended fluorescent fixtures in general office areas, have installed air conditioning equipment for offices and musical transcription facilities in shop sections.

In conclusion, it may be summarily stated that the 3-fold purpose of any lighting installation is to (1) provide efficient and comfortable seeing conditions for various types of visual work, thereby (2) lessening eye fatigue and possible strain, while (3) increasing the recipient's comfort, speed, accuracy and morale. We believe that a good lighting installation should complement both the task and the environment, while good lighting maintenance is an opportunity as well as a responsibility for organizations such as ours. This existence, we maintain, is justified only through conscientious service.

Renewing a primary system by . . .

Drying Varnished Cable In Conduit

By Harry D. Jefferson, Electrical Engineer
Dole Hawaiian Pineapple Co., Honolulu, Hawaii

TEN YEARS ago the Dole Hawaiian Pineapple Company installed a two-feeder, selective, radial 12,000-volt primary distribution system feeding 24 power centers throughout our plant. The system consists mainly of 10,000 ft of 3½-in. conduit, each containing three 4/0 varnish cambric shielded braided cable rated at 15,000 volts grounded.

We selected this relatively cheap cable because Megger records and inspection of a 480-volt radial system installed 20 years earlier showed practically no loss of dielectric strength; and the French talc which we had used as a pulling aid was still fresh and soft, indicating freedom from moisture. The new system, including one-half mile of pole and line, when completed Meggered 100 megohms with a power driven 1,000-volt Megger in three minutes.

Each successive yearly Megger reading caused more concern because of the constantly dropping dielectric strength which in nine years reached a dangerous low of 6 megohms. Dole was faced with the probability of purchasing 30,000 ft of rubber-type insulated 4/0 cable. We thought that varnish migration might be the cause of the low reading. To prove this we isolated a 150-ft section of conduit between two pull boxes, and through it we aspirated air. This air first went through a large tube containing silica gel in which blue indicators were dispersed. Then the dried air was slowly passed through the conduit and finally through a smaller tube of silica gel. By changing the silica gel and regenerating it as indicated, we could tell by weighing that moisture was present. This procedure took about three months, removing moisture continuously, from which we concluded that it was in the varnished cambric itself.

Five hundred pounds of silica gel in 3½-oz packets were then purchased and distributed in the various pull boxes which were then carefully sealed with duct seal to exclude air leaks. At one of the boxes a tube was installed so the conduit could "breathe". This tube ended in the head space of a barrel filled with silica gel. Air to the head space has to go through the silica gel. On this barrel, as on all the other pull boxes containing silica gel, we had mounted a test tube sealed in a reducing bushing. This test tube is filled with blue indicator silica gel with a stopper of spun glass and acts as a visual indicator.

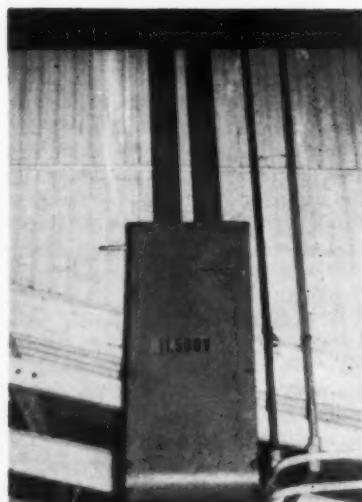
As the silica gel in the packages picks up moisture, the indicator changes from vivid blue to violet, to dark pink and finally to light pink indicating that the silica gel is saturated, having absorbed 35% of its weight in moisture from the surrounding air in the conduit and boxes, which is then at 60% relative humidity. At this point, the silica gel is removed and reactivated by subjecting it to heating at 275°F. until dried.

During six months we have reactivated the silica gel twice and have picked up over 100 lbs of moisture during which time the Megger readings have been climbing constantly and steadily until they have now reached 60 megohms. It is anticipated that after 18 months or two years, we will closely approach the original Megger readings with a possibility of even exceeding them.

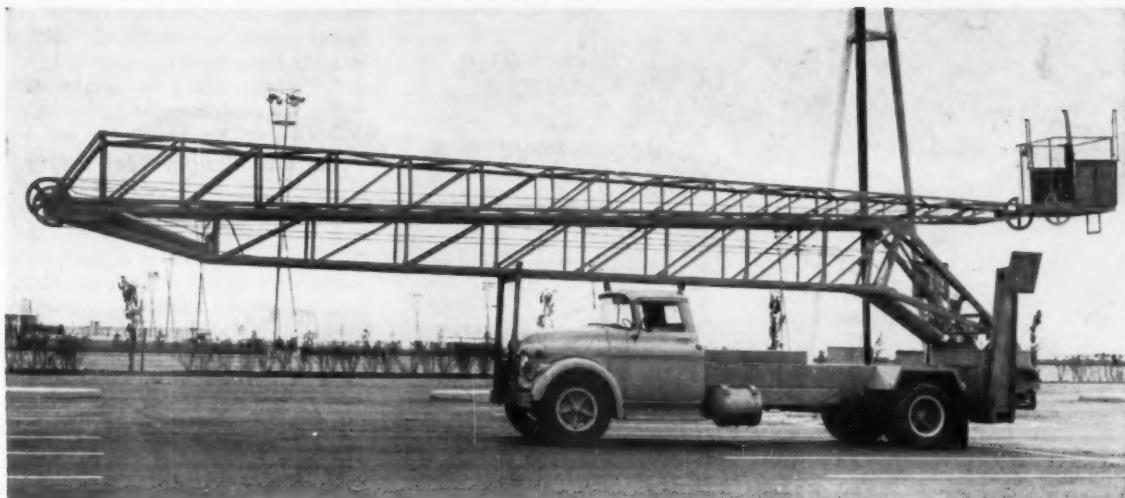
The silica gel cost \$300 and some labor was involved in installing the method, removing and reactivating the silica gel, etc. This, however, was a very small sum compared to that of installing 30,000 ft of cable at about \$6 per ft installed. Reactivation will be necessary about once a year, at about \$50 for labor.



SILICA GEL in this barrel is used to absorb moisture from varnish cambric insulated conductors in conduit. Thin tube from top of barrel connects to pull box through which the system breathes. Test tube on cover of barrel contains blue indicator which changes color as silica gel becomes saturated.



12KV PULLBOX in the primary distribution system contains silica gel packets to absorb moisture and has test tube indicator on upper left side.



AERIAL TOWER, when folded down, has overall height of 13½ ft., thereby permitting mobile unit to pass beneath all underpasses, sign structures and luminaire arms overhanging many of the roadways encircling the airport. Self-leveling working basket remains parallel with ground at all times due to pantograph action of sheaved cables.

**Elevated maintenance
is facilitated by . . .**

MOBILE AERIAL TOWER

. . . having 95-ft reach, stabilizing outriggers, both platform and ground controls, platform-to-cab telephone connection and numerous safety features.

DUE to unusual mounting heights of both exterior (parking and central mall) and interior (hi-bay hangar) floodlighting equipment at New York's International Airport, the mobile aerial tower which is used for relamping and maintenance of fixtures has reach, stability and safety features which are considerably in excess of similar-purpose units of standard design. For example, the hydraulically operated jack-knife boom has a maximum platform-to-ground height of 95 ft, while horizontal movement covers a circle having a 58½-ft radius. This boom can also support a working-platform load of 1500 lbs in all

working positions with the turntable not rotated; a platform load of 1000 lbs at maximum horizontal extension with the turntable rotated to any degree; and a wind pressure of 50 mph when the boom is at its maximum height.

The tower assembly consists essentially of a base, folding boom, turntable, outriggers, platform and control equipment, mounted on and supported by a GMC truck having a GVW (gross vehicle weight) of over 11 tons, approximately a third of this total weight being that of the chassis, and two-thirds being the weight of the tower and auxiliary equipment related to it. The tower assembly is of welded con-

struction, formed from commercial structural steel rolled shapes having a designed safety factor of six, and mounted to a prefabricated steel base so that it may be removed as a self-contained unit if so desired.

The boom itself is a 2-section unit which is raised and lowered by means of double-acting hydraulic cylinders connected via double-wire braid hose and seamless-steel tubing to remote controls and 4-way valves located at the base of the lower boom. Pilot check valves in cylinder ports lock fluid within the cylinders when pressure is removed, thereby preventing the elevated working platform from settling due



EXTERIOR high-level maintenance includes cleaning and relamping of 1500-watt mercury-vapor floodlight units mounted atop 75-ft 3-legged towers. When fully extended, aerial tower has maximum reach of 95 ft, while working platform can be moved anywhere within a 58½-ft radius with complete stability. Design also considered wind pressure of 50-mph.

to either hydraulic line failure or control valve leakage. Hose and fittings have rupture resistances of 6 tons psi, while various types of release valves prevent damage to cylinders resulting from entrapped fluid creating excessive pressures. All vital components subject to mechanical injury are either enclosed within the structure or are protected with suitable guards, while tower sections are of tapered cantilever design to obtain maximum strength and rigidity.

Hydraulic pressure to operate this boom is supplied by a gear-type pump driven directly by a heavy-duty power take-off on the truck transmission. The hydraulic system is energized by means of a toggle

switch that actuates a solenoid valve to allow pressure from a 10-gal accumulator to enter the line to boom control valves as desired.

Rotary movement of the boom is by means of a rigid turntable mounted atop a sealed ball-bearing raceway. Rotary movement is actuated through a roller chain and a 3600-to-1 gear reduction unit. Rotation is full-circle, with sliding stops that can be arranged to stop the rotation of the tower without shock when the platform is suspended over the front end of the truck. When the folded tower is in this position, resting upon a bumper-mounted cradle, the entire mobile unit has a maximum over-the-road clearance of 13½ ft. This

clearance thus permits the aerial tower to pass beneath all underpasses, sign structures and luminaire arms overhanging the airport's various roadways.

Platform Designed for Safety

The working platform mounted atop the folding tower has a 40-by 40-in. floor area surrounded by waist-high safety railings and 3-in. kick plates. In addition, it has an expanded-metal back and two piano-hinged aluminum side ramps which can be locked in upright positions or swung down in arcs not greater than 100 degrees from the vertical. These ramps also have protective pantograph-type railings, and, like the floor of the main platform, they are surfaced with non-slip abrasive material. The main platform is designed to support a 500-lb load, while ramps have rated capacities of 200 pounds with a safety factor of three.

To hold the platform constantly level in relation to the truck chassis and the ground, a dual system of cables and sheaves likewise follow the pantograph principle. Cables have tensile strengths of 7000 lbs, so that in the event of damage to either cable, its counterpart could safely support the full moment of the loaded platform.

Operating controls for movement of the tower are located on the working platform as well as at the base of the tower, the platform control consisting of a spring-centered control handle which is so arranged that its movement in any direction causes a corresponding movement of the tower and platform. Movement of this control actuates a master slave hydraulic system which, remotely, then directs the action of two master base-mounted control valves. A foot-pedal "dead man" control is also provided on the working platform so that if pressure upon it is released, platform motion will stop instantly. Regardless of the position of the platform control handle, however, the tower can be master-controlled from the turntable station so that, in case of an emergency, full control can be obtained from this ground-based position.

Wheel-base of the 6200-lb chassis measures 17 ft, while the engine is a 6-cylinder 150-hp gasoline-fuelled unit. Transmission is of synchromesh design, with five forward speeds and one reverse, and

with power take-off ports provided on both sides of the transmission.

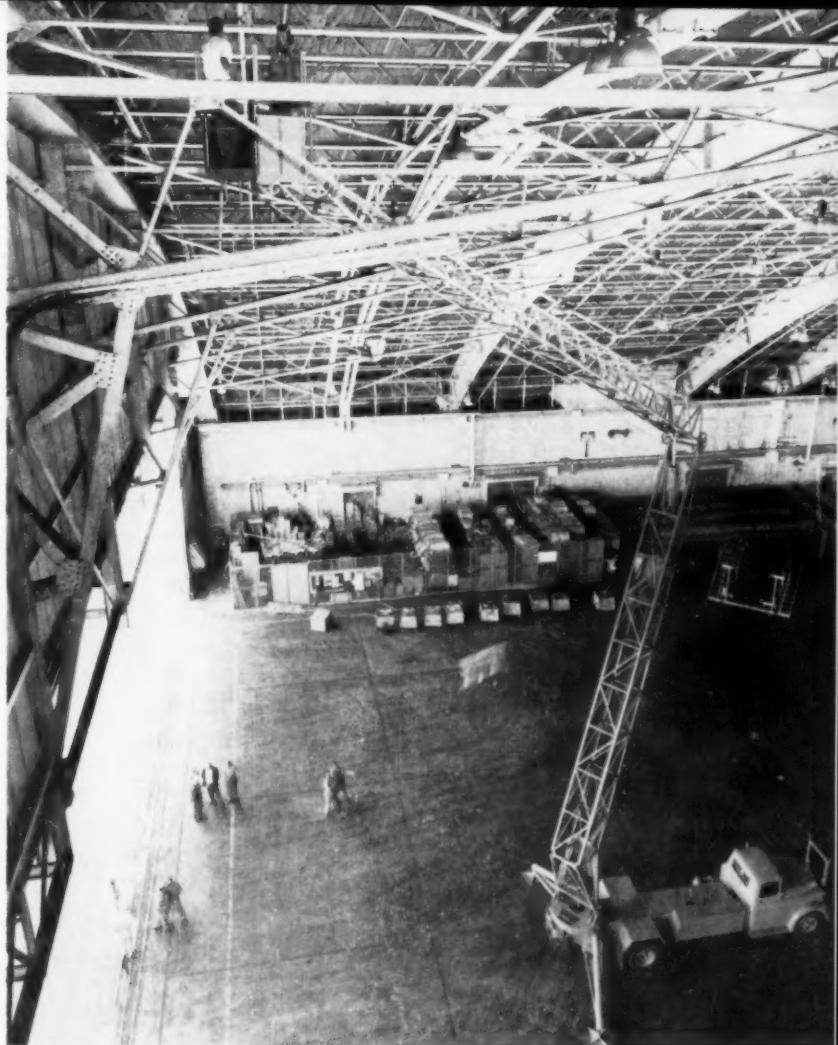
A complete 12-volt electric system is also included: a heavy-duty battery having a rating of 70-amp-hours at a 20-hour rate, and a 2-brush 3-phase 100-amp alternator-type generator being equipped with rectifier and regulator. This unit provides ample power for the electric starter, heater, double defrosters, ventilators, horn, windshield wiper and lamps in sealed-beam headlights, stop and tail lights, cab dome and instrument panel, cab-operated spotlight, blinking directional signals, flashing lights mounted atop the cab, blinking red rear lights, plus other clearance and identification lights as required. All light circuits and electric power accessories are individually fused and controlled, while gang-type fuse boxes are plainly marked to identify each circuit.

Outriggers Provide Stability

In the interest of stability, a hydraulic outrigger is located on either side of the turntable base at the rear of the chassis. Either outrigger is capable of supporting the entire weight of the tower and truck. When in their extended positions, ground-pad centers are over 19 ft apart, while hydraulic pressure in the arms removes most of the weight from the truck's rear springs and tires. Control of these outriggers is from the rear of the truck. Guards are provided to protect outrigger cylinder rods, and either outrigger may be operated independently of the other.

Still other important features of this aerial tower unit include (1) a telephone connection between the elevated working platform and the truck's 3-man cab, (2) two dry-powder fire extinguishers, (3) weatherproof cabinets on the chassis for tools and equipment storage (4) a static grounding reel with 50 ft of cable and grounding clips, (5) two drop-forged towing hooks, plus (6) numerous warning buzzers and lights related to over-travel or over-stress of boom or outriggers.

This mobile maintenance rig is indispensable for high-level work such as that so frequently encountered at New York's mammoth International Airport, and its use provides convenience and safety of an unusually "high" order in high places.



INTERIOR high-level maintenance of mercury units within mammoth hangars is likewise facilitated through the use of this versatile mobile tower. Movement of working platform can be controlled either from the platform itself or from the truck. Phone connections between platform and truck cab permit aerial crew to communicate with those on the ground.



STABILIZING OUTRIGGERS have spread of over 19 ft, and hydraulic downward pressure in arms is maintained to relieve strain upon truck axle, springs and tires. Either arm can be operated independently, and either arm is capable of supporting the entire weight of the truck and tower. Control of outriggers is by means of lever mounted on rear of truck chassis.

Practical Methods



ELECTRIC forklift trucks load four-tiered steel racks with material.



A SECTION of the 1400-ft overhead drag line, that 4-wheeled carts are hooked onto at 20-ft intervals, travel at a rate of 36 ft per minute.

Electric Trucks and Conveyors Speed Warehousing

MATERIALS HANDLING

Newly completed warehouse of Crouse-Hinds Co., located in Syracuse, New York, features more efficient and speedier material handling by installation of various types of electrical controlled equipment. Under the previous setup, finished goods storage was inadequate. Restricted aisle space and repetitive handling were inconveniences which slowed up the shipping process.

Products are now brought into the warehouse through radio controlled overhead doors, in open-end pallet crates. They are then placed in steel racks by electrically driven fork lift trucks. These racks are placed 12 ft. apart to allow the trucks to move about freely. Located between the steel racks is a 1400-ft electrically controlled drag line. It travels at a rate of 36 ft per minute. By constructing it overhead it has proven more flexible, and installation cost was less than in the floor type. Steel carts are hooked onto this line at 20-ft. intervals and are unhooked when code on back of cart indicates to employee that items from his particular service area are required. Cart is then rehooked on drag line with code number indicating next station stop. After pickup orders are complete they are routed to the packing area.



CENTRAL PUSHBUTTON station controls all conveyors and deflector gates to expedite shipments at 6-second intervals to any one of nine outbound docks.

When complete orders have been packaged, they are placed on automatic roller conveyors which are pushbutton operated from center control panel. The conveyor distributes the material at 6-second intervals to nine outward bound stations. Deflector gates, electronically operated also from central location, guide the shipments down inclined rollers to assigned docks to be dispersed by truck.

Fluorescent lighting is used extensively throughout the warehouse, and a battery of roof fans provide constant ventilation. The electrical service enters the building underground from main plant across the street. Heat is supplied by steam from main building also, and is distributed to 40 thermostatically controlled unit heaters. The office is completely air conditioned and features continuous rows of fluorescent lighting and an inter-communication system that connects offices, the main building, storage and dock areas.

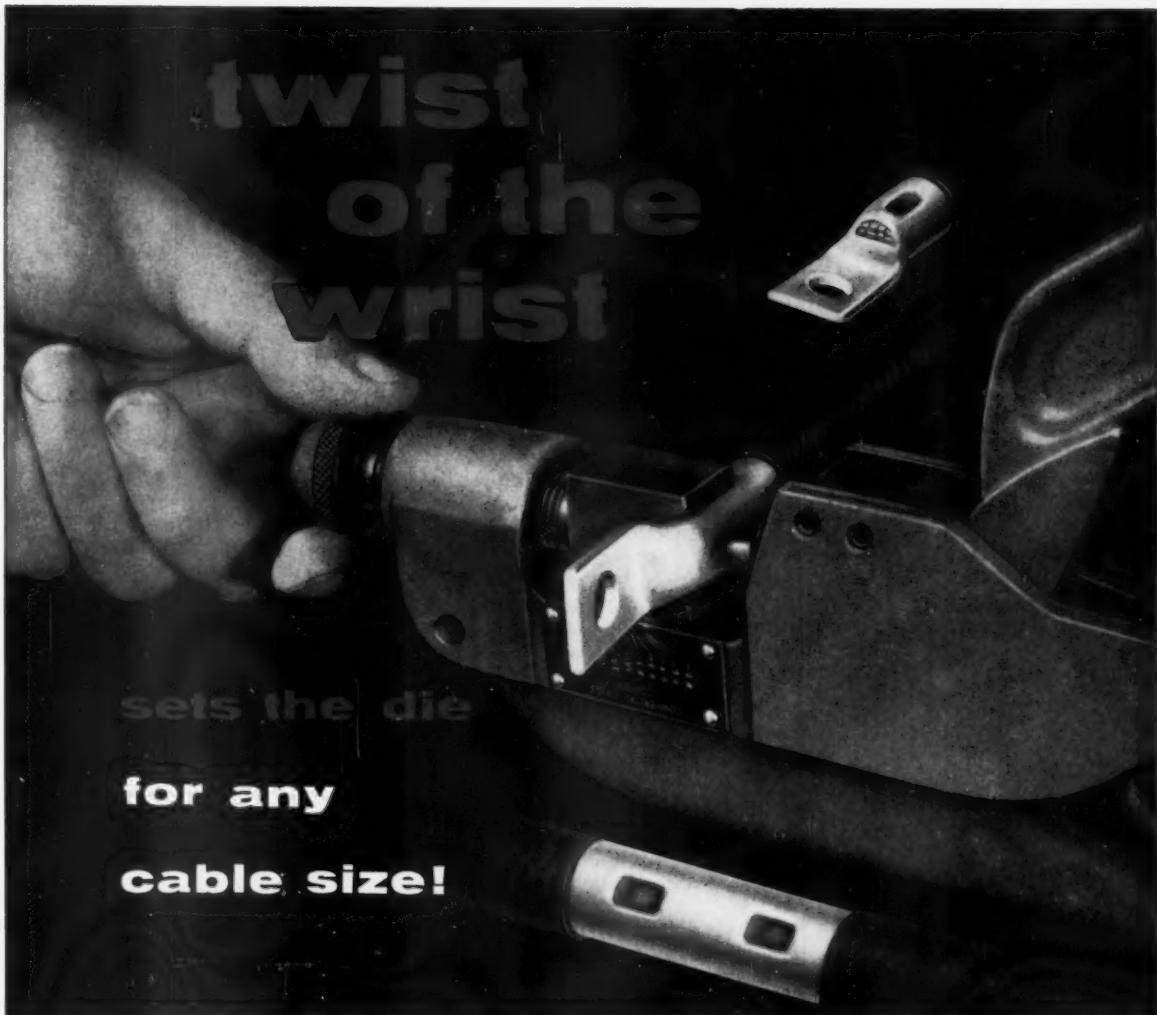


GENERAL OFFICE area features continuous rows of fluorescent lighting, air conditioning and intercommunication system.

Simple Disconnecting Means Results in Easy Maintenance of High-Bay Lighting Units

MAINTENANCE

At NBC's expanding TV center in Burbank, Calif., each successive production studio reveals numerous improvements over its predecessor, indicating that those responsible

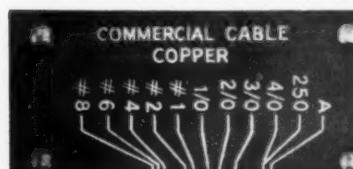


MY29 HYTOOL connects No. 8 thru 250 Mcm cables . . . without changing dies!



No die inserts to change . . . to identify . . . to store or mislay! A twist of the wrist, and you're ready to connect *any* of the wire sizes . . . with a single stroke! The cable-size scale (below) positions the nest die. Two such scales, one on each side of the tool, *double* its versatility. In addition to commercial cables, MY29-type Hytools also install mining, aircraft, and flexible and extra-flexible cable, aluminum building wire, and other special conductors.

This rugged, lightweight tool is inexpensive, too



only... \$36⁰⁰

Ask your Burndy distributor for a demonstration.

BURNDY

56-23C

Norwalk, Connect. • Toronto, Canada • Other Factories: New York, Calif., Toronto • Export: Philips Export Corp.



MODEL 800 RECEPTACLE

seconds to wire

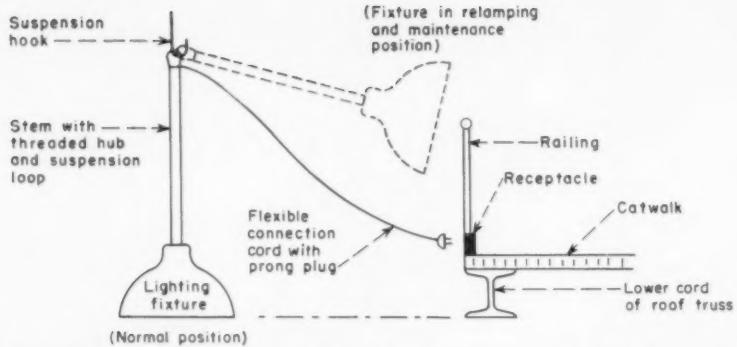
One-Hand Split-Second Wire Release Without Special Tools*

THE SLATER #800 push-wire receptacle can be installed 2 minutes faster than screw terminal types. Patented side release leaves wires straight, clean, ready to rewire. That means extra profit!

ASK YOUR WHOLESALER...OR WRITE
THE PLANT FOR INFORMATION ON THE
SLATER #800 RECEPTACLE.

* PAT. 2,795,677

Slater
Lifetime Wiring Devices
SEA CLIFF AVENUE • GLEN COVE, NEW YORK
ORIOLE 6-1100



SUSPENSION HOOK and loop at top of lighting fixture stem makes it easy to swing reflector up to maintenance catwalk railing for relamping or cleaning, while flexible cord can be disconnected from prong receptacle when it is desirable to remove a fixture entirely for repair or replacement.

for the designing, installing and maintaining of services are profiting by experience and are constantly changing their concepts and methods to take full advantage of knowledge gained through in-use observations and analysis. One of many such changes concerns the method for suspending general work-light fixtures high (42 ft) above the large (90- by 140-ft) studio floors.

In earlier structures, these fixtures were installed on rigid pipe stems, with bottoms of reflectors level with bottoms of roof-truss chords, and with circuit wiring to fixture sockets descending through the stems from a conduit-JB system installed along overhead purllins. Since maintenance catwalks were installed atop lower truss chords, the jobs of getting up under reflectors for relamping or for cleaning (from catwalk positions) were difficult and (due to height) dangerous. As a result, servicing of these work-lights was performed from mobile extension scaffolds. This was time-wasting and, as a result, often neglected.

In the most-recently-completed studio, therefore, fixtures are suspended from shorter stems equipped with threaded hubs and loops which easily slip over hooked rods, while circuit connections are via flexible cords fitted with prong plugs that may be inserted into receptacles spaced along catwalks.

With this arrangement, relamping and cleaning can be accomplished merely by swinging the fixture over to the catwalk railing, and, if a fixture is to be repaired or replaced, it can easily be disconnected at the receptacle.

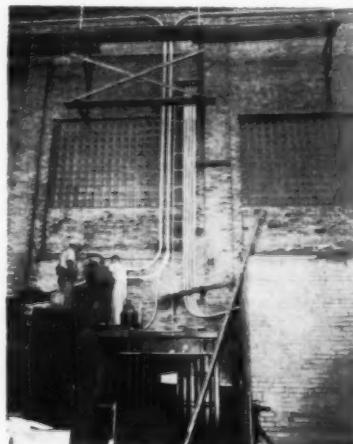
Swinging the fixture over to the catwalk is accomplished with the aid of a hook-stick, with the maintenance man remaining safely behind the railing of the catwalk.

Aluminum Armor Cables On Ladder Racks Simplify Plant Feeder Installation

WIRING

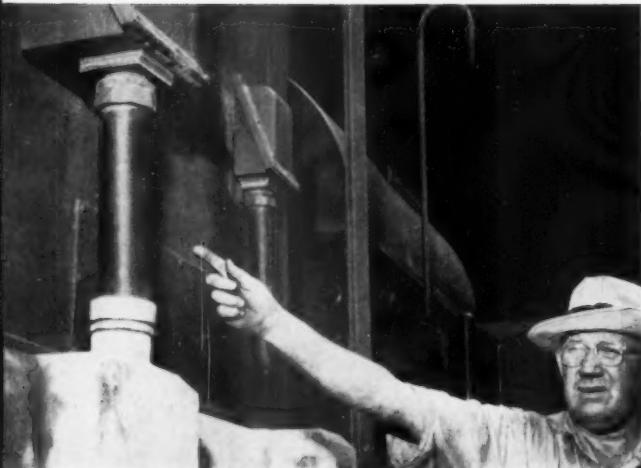
Three-conductor cables with a protective interlocked aluminum armor serve as primary and secondary feeders in a Muskegon industrial plant. Choice of aluminum for the cable armor and for the supporting ladder racks solved both weight and corrosion problems.

The 5,000-volt, 500 MCM primary cables originate at a utility 22-kv/4.16-kv substation on the plant property and distribute 4160-volt power to number of 1,000-kva, 3-phase transformers with associated 480-volt secondary switchgear. These feeders are supported by aluminum ladder racks bracket-mounted to building exteriors and



PRIMARY AND SECONDARY feeders of aluminum interlocked armor, 500 MCM, 3-conductor cables go down side of building to outdoor 3-phase transformer. 4160-volt cables are on left, 480-volt feeders on right originating in secondary switch house.

End conduit failures in these spots . . . protect wiring with Sealite flexible, liquid-tight conduit



ON INDUCED DRAFT FANS—Sealtite is used on both motor and heater connections. Here, Sealtite operates under dusty and rainy conditions . . . takes up slight movement.



AT SOLENOID VALVE—Sealtite is subject to moisture, and sulphuric acid and sodium hydroxide fumes. Sealtite will simplify replacement of parts.



TO MOTOR JUNCTION BOX—Sealtite protects wiring from dust, acids, moisture and fumes in demineralizer house. Flexible conduit takes up vibration.



ON COAL CONVEYOR BELTS—Sealtite's tough vinyl jacket stands up to dirt, grime, sulphur and moisture. Under rugged use, Sealite outlasts ordinary rigid conduit.

Moisture, fumes, vibration—tough on ordinary conduit—are licked with Sealite* flexible, liquid-tight conduit.

A tough extruded plastic outer jacket protects wiring from weather, oil and chemicals.

And flexible Sealite takes up vibration and movement . . . is easy to install . . . saves the time it takes to cut, bend and fit rigid conduit . . . cuts "down-time."

These photographs show just a few of the places where Alabama Power Company uses Sealite at their Gorgas Steam Plant No. 3, located at Gorgas, Ala. You'll find this flexible conduit economical in 1001 applications!



TYPE U.A. Tough, extruded cover seals out moisture, oil, dirt, chemicals and corrosive fumes. Copper conductor wound spirally gives positive ground inside the conduit.

WHERE TO GET SEALITE—Electrical Wholesalers stock Types U.A. and E.F.† Sealite in easy-to-handle coils, in black or gray. Be certain you ask for and get the quality conduit marked "Sealtite" on the cover. Buy it in long lengths on reels or in cartons and cut it on the job without waste. Your wholesaler also stocks liquid-tight connectors. Free Booklet S-50S gives full information on Sealite. Write: The American Brass Company, American Metal Hose Division, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. Sealite is approved by Canadian Standards Association.

*Trademark †Pat. Applied For

57181

Insist on the conduit marked

SEALTITE
flexible, liquid-tight conduit

an **ANACONDA®** product

TRADE **ARRO** MARK

EXPANDER

Hammerless setting tool

For easy, secure installation of small and medium size Machine Screw Anchors in tile, concrete and cinder block, and all types of masonry.

The ideal tool for installing anchors in bottomless holes, holes with fragile bottoms, and where ordinary setting tools cannot be used.

Safe anchor installation in hole with fragile bottom

Anchor installed in normal depth hole. Note all anchors are at same depth

Secure anchor installation in bottomless hole

ARRO

See your industrial, hardware or electrical supplier
ARRO EXPANSION BOLT COMPANY
Department D, P. O. Box 388, Marion, Ohio



POURING COMPOUND into a pothead on primary cable. Long-neck funnel connected to bottom of pothead body provides "head" to force compound into body and eliminate air voids. Mechanic at right heats funnel pipe to keep compound flowing.

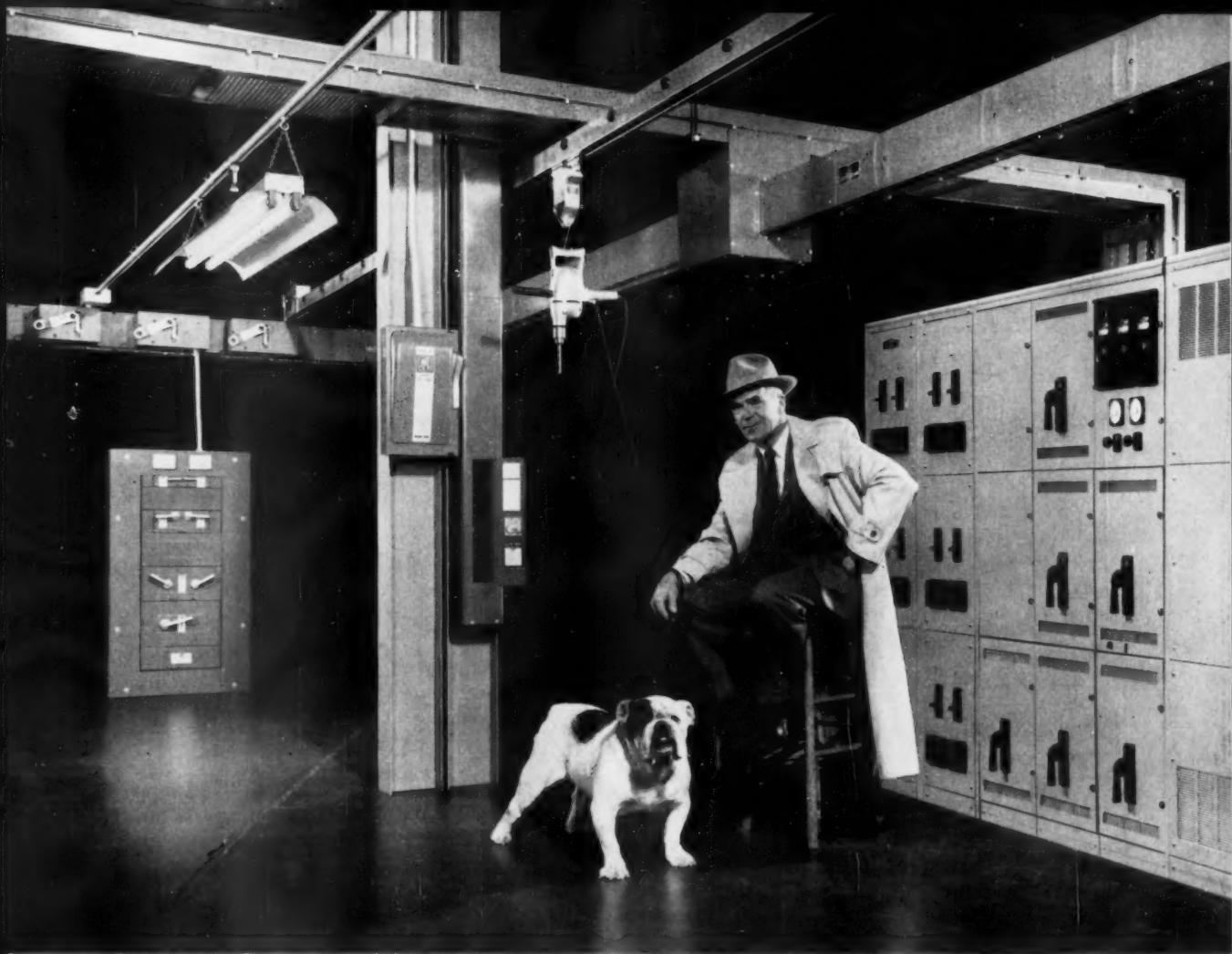


SPLIT PANEL of insulating material supports secondary interlocked armor cable feeders at switch house wall. Panel sections are bolted to angle-iron frame set in brick work.

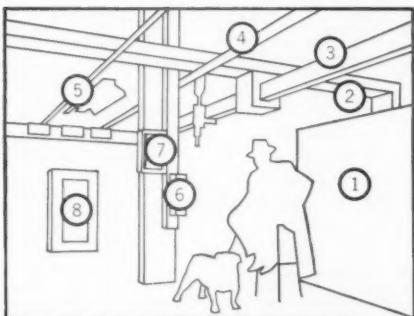
trestle-mounted on flat roof areas. Trestle construction is steel.

Secondary feeders of 500 MCM, 3-conductor, 600-volt, aluminum interlocked armor cable originate at brick-enclosed secondary switch houses adjacent to the outdoor transformers and terminate at 480-volt distribution panels within the plant. Aluminum ladder racks also are used to support these runs.

To simplify and facilitate installation, Whittaker Electric Co., Muskegon electrical contractor on the project, used a number of interesting techniques. One involved passing the armored cable through, instead of around, roof overhangs where the primary feeder run shifted from horizontal exterior wall racks to flat-roof trestles. Where such conditions were encountered, a rigid conduit elbow with extension through the roof



Electrical Planning—key to efficiency and economy, too!



PLANNED POWER on display—it's yours in a system of coordinated BullDog components.
 1. Unit Substation and Unit-Versal® Switchboards.
 2. Lo-X® Feeder Duct.
 3. Plug-in® Duct.
 4. Industrial Trol-E-Duct®.
 5. Universal Lighting Duct.
 6. Pushmatic Electri-Centers®.
 7. Clampmatic® Safety Switches.
 8. Power Panels.

Score yourself on how well you're using electricity. Is control and distribution of power getting its deserved emphasis in your plans and installations? Do your clients enjoy the benefits of a distribution system tailored to the needs of their operations—whether commercial, institutional or industrial? Such a system of BullDog equipment can provide greater efficiency, profitable use of personnel, and easy, economical growth. Contact your BullDog field engineer or distributor for complete details on the advantages of a BullDog distribution system. Make sure your customers are powered up to meet a challenging future.

© BEPCO

BULLDOG



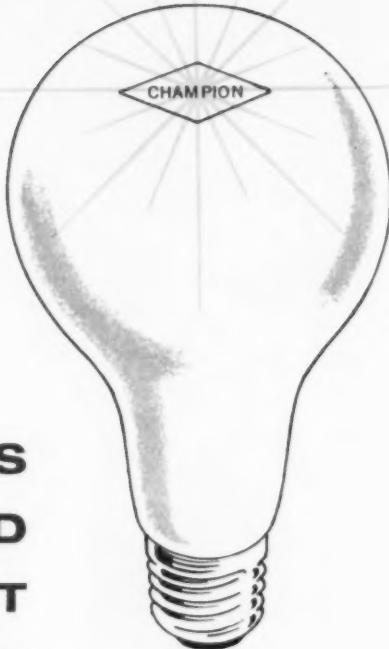
BullDog Electric Products Co., Detroit 32, Mich. A Division of I.T.E. Circuit Breaker Co.
BullDog Export Division: 13 East 40th St., New York 16, N.Y.

In Canada: BullDog Electric Products Co. (Canada) Ltd., 80 Clayton Rd., Toronto 15, Ont.

**ALWAYS
GOOD
LIGHT**

thanks to

CHAMPION



CHAMPION

LIGHTMANSHIP

Strict Quality Control —

One example of how Champion applies Lightmanship to make sure your customers get all the light they pay for. Photometric testing, as shown at the left, helps in maintaining the light output of Champion Lamps at the highest possible level.



MILLIONS OF LAMPS A YEAR . . .
ONE PLANT standard of quality control

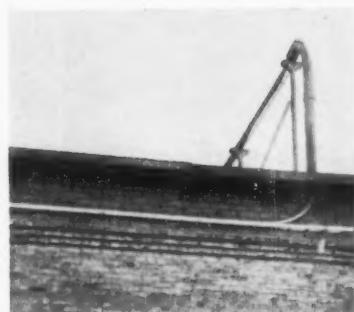


Incandescent Fluorescent
Your best buy in lamps

CHAMPION LAMP WORKS

Lynn, Massachusetts

A division of Consolidated Electric Lamp Co.



CONDUIT ELL AND SLEEVE carries 4160-volt armor cable feeder from roof trestle rack through roof eave to wall ladder rack extending along building to transformer location.



POWER VISE coupled to conventional cable puller mounted on yard steel structure provided necessary pulling power to install armor cable feeders on wall and roof racks at speeds up to 9 ft per minute.

eave was fastened to the roof trestle. The cable continues from the roof ladder rack through the conduit to the horizontal wall rack and down to the transformer.

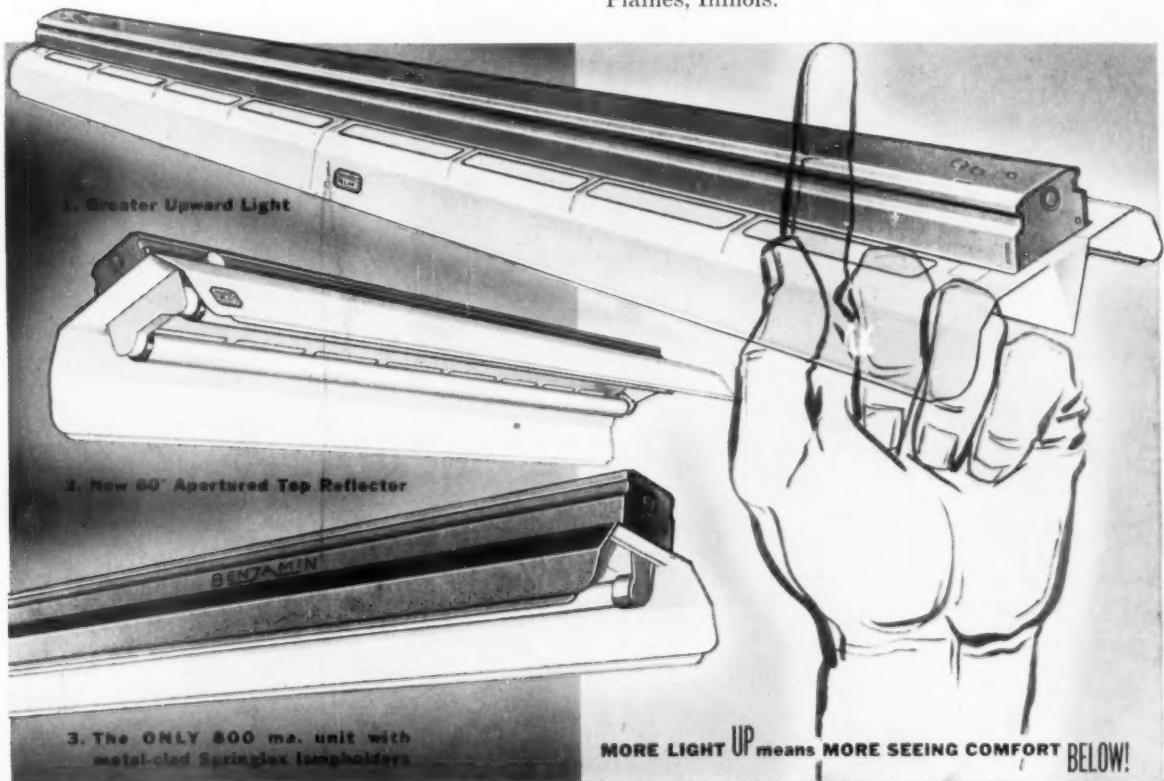
Long cable runs were installed with relative ease. After wall and trestle racks were in position, Whittaker mechanics set up the cable-pulling equipment. Triple-sheave assemblies were used extensively to guide the cable around rack offsets and around points where change from horizontal to vertical direction was necessary. Where needed, removable rack rollers were used to minimize frictional resistance between cable and rack. Pulling power was provided by a conventional cable-puller coupled to a power vise. With this arrangement, armor cable runs of 750 ft were made with a single pull at speeds up to 9 ft per minute.

Even the addition of compound to pothead casings was a comparatively simple operation. To eliminate voids due to air bubbles, the compound was poured into the bottom of the upright pothead using a large funnel with a long pipe-neck. This positioned the funnel well above the tips of the pothead in-

Take Complete Advantage of the Latest Advancements in Factory Lighting with these 3 NEW BENJAMIN LIGHTING UNITS

Greater seeing comfort through more upward light. More light for the money with new higher output fluorescent lamps. These are new trends in factory lighting; trends that can help plants get a greater return on their investment in machinery, equipment and personnel. Now, Benjamin offers a choice of

three new lighting systems so fullest advantage can be taken of these advancements. Each system embodies distinctive Benjamin design and construction features which add to its easy, quick, trouble-free installation. See your Benjamin Catalog for complete details. Benjamin Electric Mfg. Co., Des Plaines, Illinois.



1. NEW RLM SD-1 Unit with 25% Upward Light

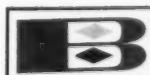
Seeing comfort in factories is greatly improved with this new Benjamin Upward Component Unit, certified by RLM. It provides higher quality lighting due to 25% upward light, 27° shielding and special high reflecting white porcelain enamel.

2. NEW BENJAMIN UNITS FOR 60° T-17 bi-pin lamps

Expansion and re-styling of Benjamin's 90/100-w line means that you can now get RLM apertured-top reflectors with 15% uplight—as well as a complete line of open and closed-end porcelain-enamelled reflectors—in the popular 60° length.

3. NEW BENJAMIN UNITS for HIGHER LIGHT OUTPUT LAMPS

LAMPS—You get 40% more light from the new 800 ma. fluorescent lamps...and with the new Benjamin units you get even more for your money from these new lamps!



BENJAMIN
...always the **source of good lighting**

Now Setting the Pace in COMMERCIAL LIGHTING

B-1479R

Vibration can't shake it out...



as permanent
as the
concrete itself

Severest vibrations have no effect on the holding power of a *Red Head* because of its full dovetail expansion. It can't pull out, rust out, melt out or vibrate loose. No expensive drills or explosive charges needed . . . every *Red Head* drills its own hole! Costs less installed than any other type concrete fastener, too. We can demonstrate this at your job site. Write for descriptive, illustrated catalog and free sample.

PHILLIPS®
RED HEAD

CONCRETE
self-drilling
FASTENER

Phillips Drill Company, Dept. H-6901, Michigan City, Ind.



TRIPLE-SHEAVE assemblies at change-of-direction points simplified cable pulling operation, permitted installation of up to 750-ft runs with a single pull.



ROOF TRESTLES with aluminum ladder racks support 4160-volt interlocked armor cable feeders running across buildings to outdoor transformer locations.

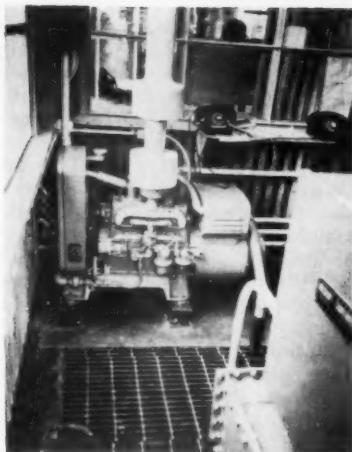
sulators and provided the necessary "head" to force the compound into the pothead body. While one mechanic poured the melted compound in the funnel with a large ladle, a second mechanic played a torch flame along the funnel pipe and elbow connection to maintain fluidity.

Emergency Power For Remote Station

POWER

Remote control is really remote at Gulf Interstate Gas Company's satellite station in Stanton, Ky. Here, a fully-automatic, engine-driven compressor is operated from a parent station 80 miles upstream at Clementsville, Ky.

This substation has a 4-cycle, 3700-hp reciprocating engine that drives the high speed compressor which can be started, stopped and monitored from the parent station. Signals between the two locations travel by telephone wires and are controlled by pushbuttons. When



EMERGENCY GENERATOR at remote station goes into action when central source of power fails.

the "start" button is pushed at Clementsville, instruments at the Stanton end start the engine rotating with compressed air, turn on ignition and feed natural gas fuel to the cylinders—all at the properly coordinated time. When the engine has properly warmed, pipe line valves open and the station begins boosting gas into the northern market lines.

While most of the controls depend on central sources of electricity, Gulf of Interstate takes no chances on emergencies or disasters that might curtail these sources. In case of power failure, an emergency electric generating plant, manufactured by Kohler Co., Kohler, Wis., goes into instant action. Using natural gas for fuel and featuring a micro-wave transfer panel, the 5,000-watt Kohler plant provides the station with electricity for lighting and power requirements.



KEN HIGUERA (center), electrical engineer for Albert C. Martin & Associates, architects and engineers of Los Angeles, discusses modernization details related to Richfield Oil headquarters with Newberry Electric Co. electrical engineer John Engert (left) and electrical foreman on the job Fred Evans.

new!

3-wire 30 amp Flush Outlet and Cap

The complete LEV-O-LOCK line of Specification (5000) Grade devices provides safe, dependable connections under severest conditions of vibration, motion or accidental pull-out.

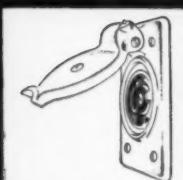
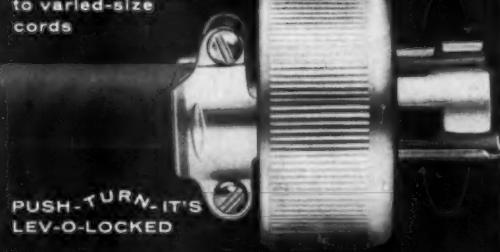


SPECIFICATION
GRADE

No. 5181
Single Flush Outlet

SPECIFICATION
GRADE

No. 5180
Armored Cap
with slideable cord
clamp that adjusts
to varied-size
cords



Can be wired for outdoor use in FS and FD type boxes accommodating 1½" weather-proof hinged plate or for Industrial use in Standard switch boxes.

For Industrial Plants, Office Equipment, Trailer Camps, Ships, Dryers in the Home, or Wherever the Code Requires 30 Amp Service. Here is the first 30 Amp outlet to fit standard outlet box covers.

Meet Underwriters' Laboratories and Federal Specifications

your best jobs are done with ...

LEVITON MANUFACTURING COMPANY, INC.
Brooklyn 22, N. Y.

LEVITON

Samples on request

Chicago • Los Angeles • Leviton (Canada) Limited, Montreal
For your wire needs, contact our subsidiary AMERICAN INSULATED WIRE CORP.

Why Shielding is Not Necessary for 5kv Okolite-Okoprene Cables

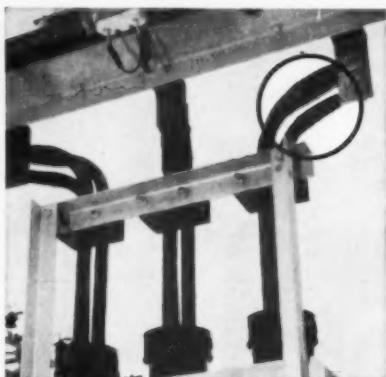
Here are the facts that will prove to you that non-shielded Okolite-Okoprene cables for 5kv service can—

- save you money
- simplify splicing and terminating
- eliminate grounding problems

Old-Fashioned vs. Modern Practice

It is a fairly common practice for some engineers to follow convention by shielding all rubber-insulated cables for operation at over 3000 volts. Shielded cables, however, are expensive and to install them properly is a costly and time-consuming job. Considerable skill must be exercised to avoid having splices and terminations that will give trouble. Shielding that is improperly grounded offers a real hazard to human life.

It is not necessary to accept these higher costs and difficulties



Typical labor-saving application of non-shielded 5kv cable. Non-shielded cables like these save space, terminate like a 600-volt cable. Shielded cable would require extra cost of stress cone plus a longer unbent section.

for 3kv to 5kv installations because they can be eliminated by choosing properly designed non-shielded cable—such as Okolite-Okoprene—which can be handled as easily as 600 volt wire.

Modern Practice Backed by Over 20 Years' Experience

The advantages of unshielded rubber cables were first made available to the electrical industry in the mid 1930's when Okonite introduced the Okolite-Okoprene non-shielded construction for use

up to 5kv. Nearly a quarter of a century of experience has proved the value and efficiency of this design which has since been adopted by many other manufacturers. Today, non-shielded cables are carried as standard stock items to meet the substantial demand for this type cable which users find reduces material costs, simplifies splicing and terminating, and eliminates grounding problems.

The non-shielded braided cables widely used 20 years ago frequently failed in damp locations because of discharge damage caused by the surface drainage of charging current arcing at points of casual contact with ground or an adjacent phase. Furthermore, the surface charges on braided cable presented a hazard to personnel. The National Electrical Code (Sect. 7107) has recognized this problem and does not permit the use of braided cables for service above 2kv in wet or damp locations unless they are shielded. Okolite-Okoprene non-shielded 5kv cables, using a new approach, solved this problem by eliminating the fibrous braid covering and replacing it with a carefully compounded neoprene sheath whose built-in dielectric qualities and inherent stability reduced drainage current to an insignificant minimum.

It requires a considerable degree of skill and experience on the part of the manufacturer to develop and produce a neoprene sheath of the necessary quality. Otherwise, the user will be forced into the costly alternative of purchasing shielded cable. E. I. duPont de Nemours and Co., Inc., the producers of basic neoprene have frequently stated that: "Too much stress cannot be laid on the important fact that the best neoprene products are produced by those manufacturers who are skilled in the art of compounding neoprene."

Certain cable specifications recommend shielding for neoprene-sheathed cables operating above 3000 volts. This requirement is

intended to protect users from failures in cables having neoprene sheaths that do not possess proper electrical qualities. If such specifications called instead for a neoprene covering having stable electrical characteristics equal to an Okoprene sheath, this costly shielding requirement could be avoided to the obvious advantage of the user.

With the development of the Okoprene sheath, users obtained a premium quality 5000-volt cable that not only helped them to reduce costs but also helped them to eliminate the problems that are involved when using shielded cables.

Correct Cable Design Key to Modern Practice

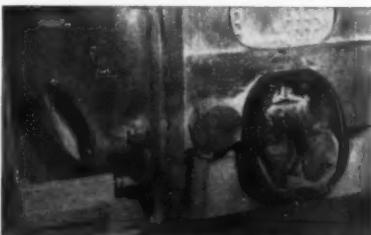
In designing this pioneer non-shielded cable, Okonite engineers included two essential components—a superior quality insulation and a dual purpose protective covering.



The insulation chosen was Okolite, an oil-base rubber compound, field-proved at voltages up to 35kv and possessing a high degree of heat and moisture resistance and stability as established in central stations, industrial plants and submarine circuits.

The covering was Okoprene, a rich neoprene compound specially formulated to provide excellent ozone resistance, high surface resistivity and high corona discharge level. Okoprene also possesses desirable mechanical features such as weather resistance, chemical resistance and ability to resist mechanical abuse.

The nation-wide acceptance of Okolite-Okoprene unshielded 5000-volt cables has been based on more



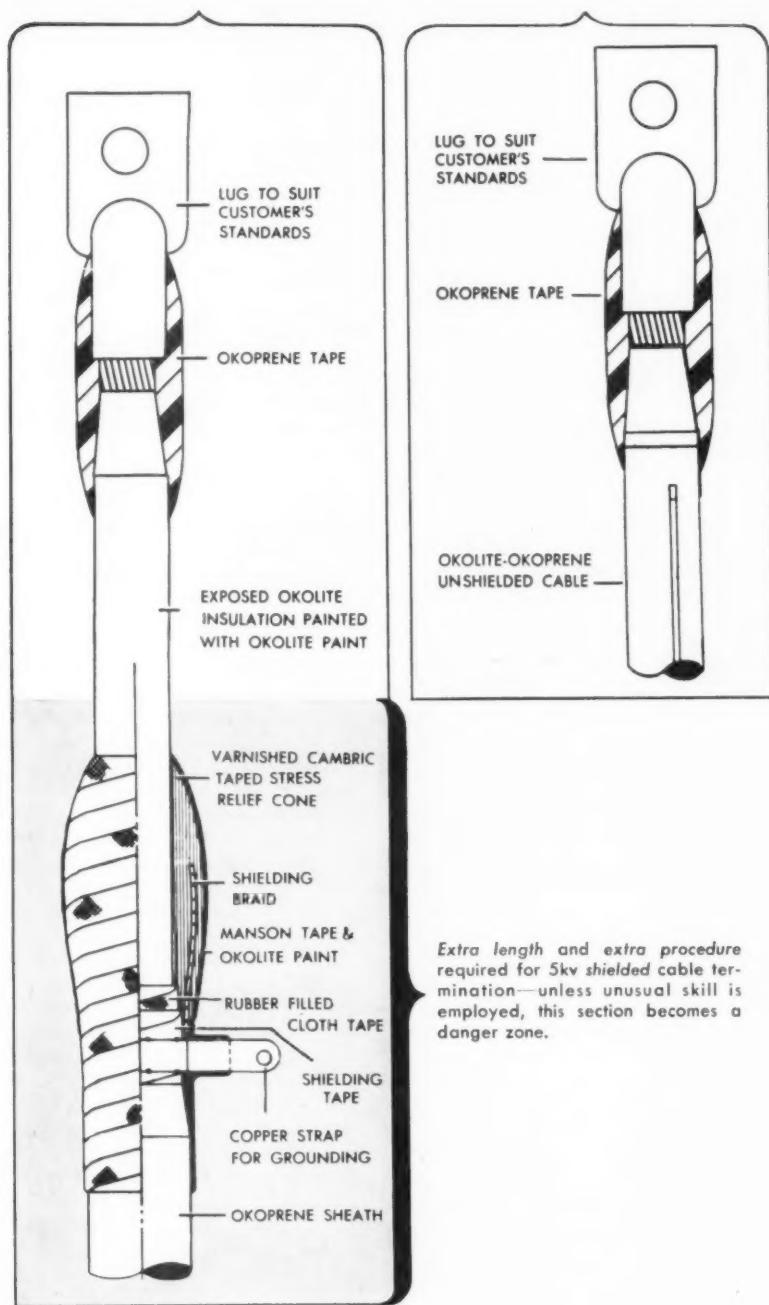
Typical terminal box for motor leads to 5000-volt motor. Standard boxes are a tight squeeze even for non-shielded cables. It is impossible to terminate shielded cables safely without providing a special box large enough to include the necessary stress cones.

ADVERTISEMENT

Compare the difficult termination of shielded cable with simple termination of unshielded cable.

a. Shielded 5kv cable requires time-consuming and long, complicated termination.

b. Non-shielded 5kv cable termination is simplicity itself, requiring minimum space.



than 20 years of satisfactory field experience. During this period Okonite research and manufacturing activity has been devoted to further studies that will help to improve even this unequalled record. Okonite's policy is to foster developments that will provide cable users with greater values in economy, performance and reliability and to support efforts that will encourage, rather than restrict, advances in the art.

Unique Testing Procedure Confirms Cable Quality

In addition to the higher-than-normal industry high voltage a-c and d-c factory acceptance tests, the "Gooding Test Train" recently developed and used only by Okonite, provides additional safeguards for all cables insulated for operation over 2000 volts. This electronic testing equipment, which scans every inch of the completed Okolite-Okoprene cable, can pick out the most minute imperfections—impossible to detect by any other test method—that might shorten cable life after it has been placed in service.

This new and significant advance in high-voltage, non-destructive cable testing now allows Okonite to supply 5kv non-shielded Okolite-Okoprene cables that are even more reliable than their exceptional service record indicates.

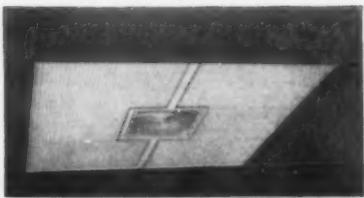
The Economics of Shielded vs. Non-Shielded Cable

There is no question that non-shielded cable can be installed at considerably less cost than shielded cable. A comparison of the cable terminations shown here clearly demonstrates the simplicity of non-shielded cable terminals. No special training is required and splices, too, are easy to make. Splices and terminations for a typical shielded cable installation take $2\frac{1}{2}$ to 4 times as long as for a non-shielded 5kv rubber-insulated neoprene-sheathed cable.

For complete information on Okolite-Okoprene unshielded cable, write for a free copy of Okonite's 128-page bulletin EC 1085 to The Okonite Company, Passaic, New Jersey.

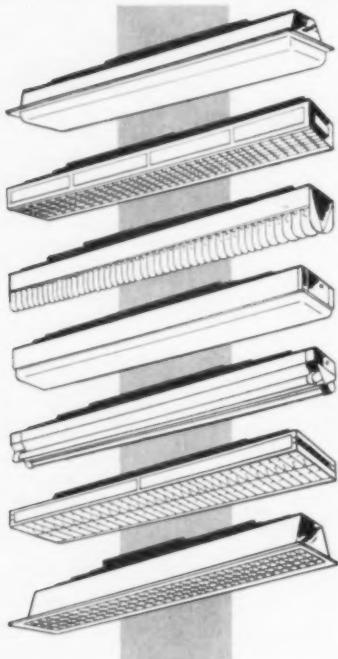


where there's electrical power . . . there's OKONITE CABLE



WILEY

STARTER TYPE—RAPID START
SLIMLINE LIGHTING FIXTURES



- Pioneers in Fluorescence since its inception.
- Modern functional designs.
- Stock fixtures adaptable for all lighting layouts.
- Units designed for quick, easy erection.
- Patented E-Z Servicer.
- Designed and manufactured by WILEY with ETL Certified Electrical Components.

*District Sales Engineers Available
for Prompt Co-operation*

For Full Information, write



WIRING

Type AC Switch Application

Ratings, uses and applications of type AC general use snap switch.

By P. H. Winter,

Chairman, General Engineering Committee,
Wiring Device Section, NEMA

WITH the establishment of a test and listing procedure for ac general-use snap switches by the Underwriters' Laboratories, their use is increasing rapidly. There is still, however, some lack of understanding of the advantages of these switches, particularly since there is little reference to ac general-use snap switches in the 1956 edition of the National Electrical Code. However, the Code Making Panels concerned with this subject and the Underwriters' Laboratories have gone on record as permitting their use.

In the introduction to the National Electrical Code, the paragraph on Examination of Equipment for Safety states that specific items of equipment and materials covered by the code must be examined for safety under standard conditions and also inspected at the factory by organizations properly equipped and qualified for experimental testing. The only organization which meets these requirements on a nation-wide basis is Underwriters' Laboratories, Inc.

In the Electrical Construction Materials List published by the Underwriters' Laboratories and listing all materials which have been found by the Laboratories to be suitable for use under the National Electrical Code, the following definition appears in the section on snap switches: "AC general use snap switches (flush and surface types) are tested for controlling resistive, inductive (including fluorescent lamp) and tungsten-filament lamp loads (at 120 volts) up to the full current rating of the switch, and for motor loads

up to 80% of the ampere rating of the switch.

Code Interpretation

This definition is necessary to fully understand Section 3814 and 4383 of the National Electrical Code. Paragraph B of Section 3814 recognizes the suitability of ac general-use snap switches for tungsten-filament lamps and does not require the appearance of a "T" marking on the switch. In fact, the Underwriters' Laboratories do not permit the "T" symbol on ac general-use snap switches because it would be redundant and confusing. Paragraph c of Section 3814 does not specifically mention ac switches but states that switches controlling inductive loads shall have an ampere rating twice the ampere rating of the load *unless they are of a type approved for the purpose employed*. The definition in the Electrical Construction Materials List of Underwriters' Laboratories, Inc., shows that ac general-use snap switches are tested for inductive loads at the full switch rating and are thereby approved for the purpose employed. It is therefore not necessary to derate ac switches when controlling inductive loads which mostly means fluorescent lighting. Section 4383, Paragraph b, permits the use of a general-use switch having an ampere rating at least twice the full-load current of the motor for motors of 2 hp or less. However, "general-use switch" is employed in this paragraph in a different and older sense and, when using ac general-use snap switches, this statement is

modified by the Official Interpretation No. 397, which states:

"It may be used to control a motor having a full load current rating equal to 80% of the switch rating." This is based on the Underwriters' test procedure as quoted above from the Construction Materials List. Using Table 22 of the National Electrical Code a 15-amp ac general-use snap switch can control a $\frac{1}{2}$ -hp motor at 115 volts and a 2-hp motor at 230 volts; a 20-amp ac general-use snap switch can control a 1-hp motor at 115 volts and a 2-hp at 230 volts.

The cross-referencing of the National Electrical Code and the Underwriters' Laboratories' literature makes it somewhat difficult to fully realize the potentialities of the ac general-use snap switch; but once understood, these broad potentialities become quite plain.

Advantages

It might be well to briefly outline the advantages of ac general-use snap switches over general-use ac-de switches. AC general-use snap switches are rated in terms of branch circuit ratings, 15, 20 and 30 amps, and are designed to control all loads that may be placed on a branch circuit. The 15 amps minimum current rating of ac general-use snap switches permits more load to be carried than the ac-de 10-amp switch can handle. Many 15-amp switches also carry a 15-amp, 277-volt rating which permits their use with fluorescent lighting operated on 277 volts derived from a 480-volt, 3-phase, 4-wire system. Since no derating for inductive loads is necessary, a 15-amp ac switch will control a 50% greater load than a 20-amp ac-de switch and a 200% greater load than a 10-amp ac-de switch. The advantage becomes even greater with the 20-amp ac switch, which will control 100% more current than a 20-amp ac-de switch. Being able to control more lights from one switch point results in considerable installation economies.

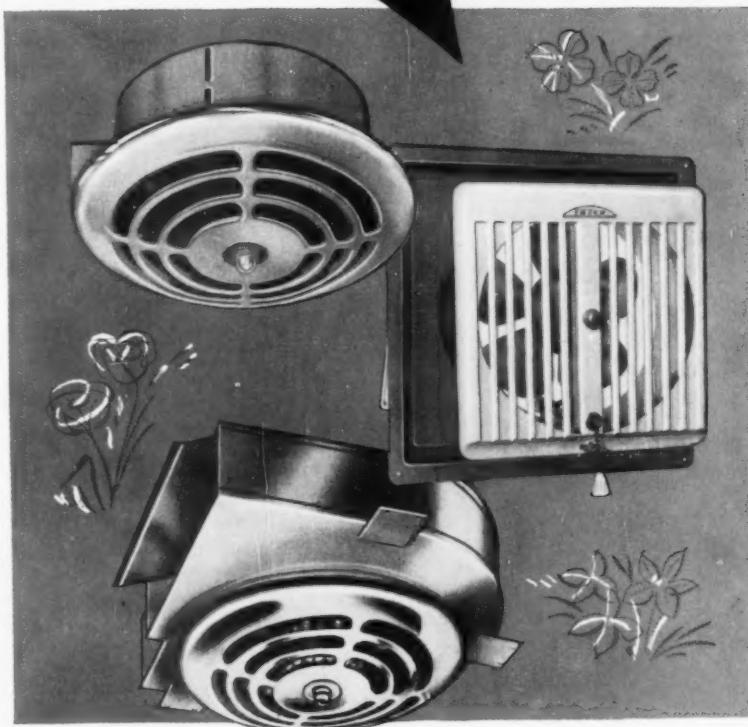
Since ac general-use snap switches are designed for slow break and small contact separation, the moving parts inside the switch are light and move slowly. This decreases the noise level of the switch. The absence of heavy, fast moving parts also results in an extremely durable switch mechanism. The minimum mechanical life may be considered 100,000 cycles.

It will pay you to take a

**fresh
LOOK**

at

ASCO



You will find it pays in more ways than one to take another look at Fasco. You'll see a complete line of ventilating fans all with smart, "no-rust" aluminum grilles. You'll see ventilating fans that cut installation costs . . . the slimmest ventilating fan on the market . . . and a host of other features in this value-packed line designed and priced to reduce your costs.

So take a fresh look at all the fresh new Fasco features . . . they will convince you Fasco ventilating fans are your best buy today!

FASCO INDUSTRIES, INCORPORATED

126 Augusta Street • Rochester 2, New York

Fill in coupon below.
Use page margin.

There's a fresh look at

ASCO

Please send me full information on the Ventilators and new power Range Hoods

▼ NAME and ADDRESS

▼ CITY and STATE

ECM-158

"Enough Give in RAWLPLUG MASONRY ANCHORS TO ABSORB VIBRATION of HEAVY DOORS" . . .

says RAWLPLUG USER FOR OVER 20 YEARS

Modern Doors Inc., Maplewood, N. J., manufacture overhead doors. They have served New York and New Jersey for over 30 years. Their heavy industrial doors are custom made and hung by their own installers.

From 4 to 12 Rawlplugs are used per door—only one size is used— $\frac{3}{8}$ " x 2" for $\frac{3}{8}$ " lag bolt.

"NEVER HAD ONE 'LET GO'...." says Dan Rice, Foreman.

"There is considerable vibration and movement in raising and lowering these doors. There is enough 'give' in Rawlplugs to absorb this vibration. If shields are used, they will let go after a period of time. I've been using Rawlplugs for over 20 years and never had one 'let go'."

We give a one year guarantee against defective workmanship on all of our doors. I never have had to go back to replace a Rawlplug."



Blade type switches with combined ac-de ratings need a long distance, high-velocity break in order to handle occasional dc applications and, as a result, only sliding contacts are practical. This necessitates fairly hard resilient material. Because of electrical characteristics, either bronze or brass is used for contacts in ac-de switches but, unfortunately, the copper oxide formed on these contacts under the action of the arc is hard and non-conductive. Switches which are left "on" for long periods of time, such as in commercial and industrial buildings, schools, museums, etc., are not operated often enough to completely wipe off the oxide with every cycle of use. This is aggravated by loading the switches close to their full rating in the engineered installations which are common in this type of building. This imposes a heating load on the contacts which accelerates the formation of the oxide. As the oxide is not fully removed every time the switch is operated, a steady buildup of oxide occurs which results in a constantly rising contact temperature. This, in turn, accelerates the formation of oxide which finally increases the temperature to the point where the contacts and the switch fail.

The silver oxide formed on the silver alloy butt-type contacts used in ac general-use snap switches is soft and unstable under heat so that any formation of silver oxide will be automatically removed with a slight rise in temperature. It is therefore possible to have ac switches carry their full rated load for 24 hours a day, 30 days a month.

Summary

To summarize, the advantages of an ac only switch over an ac-de switch are as follows:

—Increased capacity, both in amperes and voltages.

—Ability to switch inductive (including fluorescent lighting) loads at the full switch rating instead of 50% of switch rating.

—Ability to control motors with running currents of 80% of the switch rating instead of 50%.

—Longer life.

—The 277-volt rating expands its range of use.

—Quiet operation.

—Economic advantages, because of higher ratings and capacities.

Special low-current starting costs less WHEN YOU SPECIFY



PART WINDING
START MOTORS

Here's the easy and inexpensive answer to having big motors that will start easily when starting current is limited. Part winding starting is available on all popular size Century motors up to 400 H.P., polyphase, in drip proof, totally enclosed and explosion proof frames, horizontal or vertical mounting.

For fast service from stock, call your nearby Century Distributor or Century District Sales Office.

Two 50 H.P. Century Part Winding Start motors power these unloading type air conditioning compressors. When starting, just half of the winding is energized, drawing less than two-thirds of normal starting current. In a few seconds, the full winding is connected and the motor delivers full torque at full current.



To CENTURY ELECTRIC COMPANY

1806 Pine Street • St. Louis 3, Missouri

Please send copy of bulletin "Where Low Starting Current Is Required"

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

Performance Rated[®]
MOTORS
1/20 to 400 H.P.

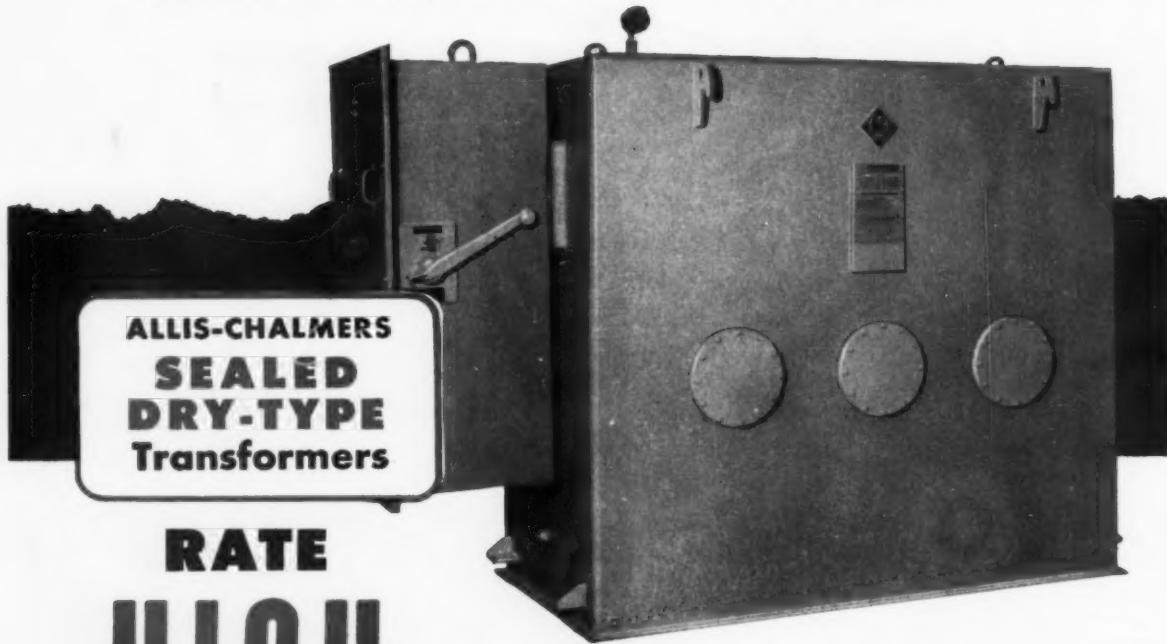


1806 Pine Street • St. Louis 3, Missouri • Offices and Stock Points in Principal Cities

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . JANUARY, 1958

We asked utilities and industrial users:

"What type transformer do you prefer for plant service, station auxiliary and load-center applications?" Sealed dry-type units rated number one in five basic categories of operation and operational cost. For all the facts, see your Allis-Chalmers representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.



	Sealed Dry Type	Open Dry Type	Askanol Filled	Oil Filled
INSTALLATION COST	1	3	2	4
LOCATION VERSATILITY	1	2	3	4
SAFETY	1	3	2	4
RELIABILITY	1	2	1	1
MAINTENANCE	1	3	2	2

Types rated in order of Preference

● **Installation Costs**—Your Allis-Chalmers sealed dry-type transformer is ready to be energized immediately upon shipment, or may be stored indefinitely until needed.

● **Location Versatility**—It can be located indoors or outdoors, overhead or underground — in flood areas, dirty and contaminated atmospheres — no special precautions need be taken.

● **Safety**—No fire or explosion hazard. Transformer unit is hermetically sealed in inert dry nitrogen gas.

● **Reliability**—Performance is unparalleled. Contaminants and moisture cannot enter case to affect service. Oxidation of insulation materials cannot take place.

● **Maintenance**—Upkeep is virtually eliminated. No liquids to maintain. No need for periodic cleanout of core and coil. Plain tank shell is easy to paint.



ALLIS-CHALMERS

**FOR MORE INFORMATION ON
NEW PRODUCTS
CATALOGS, BULLETINS
ADVERTISEMENTS**

USE THESE CARDS

● PRODUCT NEWS, PRODUCT BRIEFS:

Use first line of boxes. Insert item numbers of products on which more information is desired.

● CATALOGS, BULLETINS AND ENGINEERING DATA:

Use second line of boxes. Insert item numbers of literature desired.

● ADVERTISEMENTS:

Use third line of boxes. Insert page numbers of advertisements on which additional information is desired. Where more than one advertisement appears on the page, include the manufacturer's initials.

IMPORTANT...

- PLEASE PRINT LEGIBLY
- USE BLACK OR DARK BLUE INK
- DO NOT USE PENCIL OR RUBBER STAMP

Please send me without obligation further information about the following:

1/58

Product News and Product Briefs, Item Number

--	--	--	--	--	--	--	--

Catalogs and Bulletins, Item Number

--	--	--	--	--	--	--	--

Advertisement on Page

--	--	--	--	--	--	--	--

NAME TITLE

COMPANY

ADDRESS

ELECTRICAL CONSTRUCTION AND MAINTENANCE - A McGRAW-HILL Publication
NOT GOOD AFTER MARCH 1, 1958

Please send me without obligation further information about the following:

1/58

Product News and Product Briefs, Item Number

--	--	--	--	--	--	--	--

Catalogs and Bulletins, Item Number

--	--	--	--	--	--	--	--

Advertisement on Page

--	--	--	--	--	--	--	--

NAME TITLE

COMPANY

ADDRESS

ELECTRICAL CONSTRUCTION AND MAINTENANCE - A McGRAW-HILL Publication
NOT GOOD AFTER MARCH 1, 1958

Your Name and address will be reproduced and sent to the appropriate manufacturers. Illegible or incomplete addresses may result in your not receiving the information you desire.

FOR MORE INFORMATION ON

**NEW PRODUCTS
CATALOGS, BULLETINS
ADVERTISEMENTS**

The Editor
ELECTRICAL CONSTRUCTION AND MAINTENANCE
330 West 42nd St.,
New York 36, N.Y.

PLACE 2a
STAMP
HERE

The Editor
ELECTRICAL CONSTRUCTION AND MAINTENANCE
330 West 42nd St.,
New York 36, N.Y.

PLACE 3a
STAMP
HERE

USE THESE CARDS

● **PRODUCT NEWS, PRODUCT BRIEFS:**

Use first line of boxes. Insert item numbers
of products on which more information is
desired.

● **CATALOGS, BULLETINS AND ENGINEER-
ING DATA:**

Use second line of boxes. Insert item numbers
of literature desired.

● **ADVERTISEMENTS:**

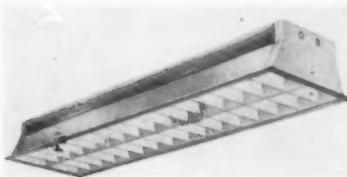
Use third line of boxes. Insert page numbers
of advertisements on which additional infor-
mation is desired. Where more than one ad-
vertisement appears on the page, include the
manufacturer's initials.

IMPORTANT...

- PLEASE PRINT LEGIBLY
- USE BLACK OR DARK BLUE INK
- DO NOT USE PENCIL OR RUBBER STAMP

*Your Name and address will be reproduced and sent
to the appropriate manufacturers. Illegible or incom-
plete addresses may result in your not receiving the
information you desire.*

Product News

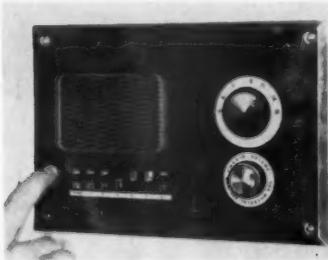


Troffer

(1)

New louver fin design, called LBQ (low brightness quality) features a parabolic cross section in extruded aluminum with diffuse Alzak finish. It is available exclusively with the new line of Curtis Eye-Comfort Alzak troffers. Its parabolic contour is engineered to reflect light downward onto the work surface and away from the critical viewing angles, reducing glare and brightness. The series also offers a heavy duty flat Alzak louver fin and a unit without louvers. Two completely symmetrical parabolic reflectors provide 42° crosswise shielding of each lamp and the louver fins provide 35° lengthwise shielding. In addition to diffuse Alzak finished aluminum, the troffers also are furnished in steel construction with flat fins and white Fluracite finish.

Curtis Lighting, Inc., 6135 West 65th St., Chicago 38, Ill.



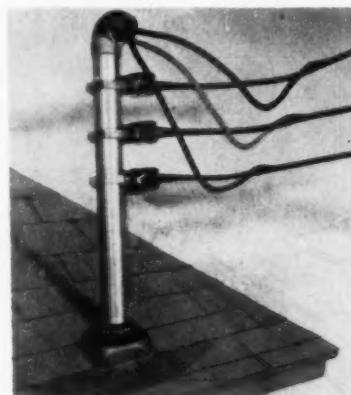
Intercom System

(2)

A music and voice intercommunication system is now available for home modernization and new construction. Fanfare "Musi-Talk" systems are packaged in two kits—an installation kit for use when the rough-in work is done, and an electronic kit for final installation. System incorporates a 6-tube printed circuit AM radio. This permits "piping" of programs to as many remote stations as desired. System features direct remote-to-remote communication, and a simultaneous operation of the radio and intercom is possible. Master

or any remotes may monitor or eavesdrop any other locations. In addition to the master control there are five remote stations—four for room and one for door annunciator use.

Fanon Electric Co., Inc., 98 Berrian St., Brooklyn 8, N. Y.



SE Mast Kit

(3)

New service entrance mast kit makes permanent installation on ranch style homes and other one-story buildings simple. Included in the kit are service entrance head, roof plate and flashing with Neoprene storm collar, mast support with lag screw, offset reducer and wireholder. Combination one-piece roof plate and flashing of galvanized steel supports the mast at the highest possible point on the house. Neoprene storm collar provides an effective, permanent weather tight seal.

Crouse Hinds Company, Wolf and Seventh North Sts., Syracuse 1, N. Y.

Protective Compound

(5)

Penn-Seal is a new protective compound, which is watertight and air-tight. It is also acid-proof and alkali-proof. Tear off enough to cover the connection completely, and roll it on. It is pliable and easily molded to exact fit on connections of all shapes and sizes. The high dielectric strength of Penn-Seal is 139 volts/mil, in thickness supplied. This can be increased by lumping at corners, and over high spots on the connection.

Penn-Union Electric Corp., Erie, Pa.



Switch

(6)

A new metal enclosed load interrupter switch, Type HPC-W is built for wall mounting where primary switching requires the safety of metal enclosures. The main switch blade is equipped with a quick-break blade with tungsten tips which extinguishes all arcing in a plastic arc chute. Stationary break contacts have special heavy spherical tips which protect the current carrying surfaces of the contact against possible high fault currents during closing operations. Housings are 11 gauge steel and are supplied with mechanical door interlocks. Cubicles are finished in synthetic baking enamel, dark gray for outdoor and light gray for indoor. Switch can be supplied for either hook or direct manual operation. Ratings are 4.8, 7.3 and 13.8 kv, for 600-amp service. Bulletin 1610A is available.

R & IE Equipment Div., I-T-E Circuit Breaker Co., Greensburg, Pa.



A Midwest quality fitting. "Quality" is just a condensed way of saying: "Getting the total job done — right — with the most inexpensive combination of material and man hours." Engineering and producing quality fittings to meet the highest standards of electrical wiring installations, is our objective at Midwest.

Midwest Electric Mfg. Company
MANUFACTURERS OF ELECTRICAL WIRING PRODUCTS
1639 W. WALNUT STREET
Chicago 12, Illinois



Busway

(7)

A new 4-pole, plug-in busway with low voltage drop characteristics, designated as Type LVDP, is rated from 600 to 4000 amps, 600 volts or less. Principal applications are as a vertical riser in multi-story commercial and industrial buildings where frequent power tap-offs are required. It comes in standard 10-ft straight lengths with either aluminum or copper busbars. Each standard length has ten plug outlets, five on each side. Type LVDP busway is interchangeable with G-E's Type LVD feeder busway and it can be installed in new or existing LVD systems where plug-in tap-offs are required.

General Electric Co., Plainville, Conn.



Truck Body

(8)

A new series of improved truck bodies, designed especially for the electrical industry. General construction of the bodies, which range from one-half to one-ton units, is of 12, 14 and 16-gauge steel, with understructure of 12-gauge steel. Variable compartment and shelving arrangements provide large storage and load areas. Compartment capacity ranges from 35 cu ft in half-ton models to 68 cu ft in one-ton models. Compartment doors are equipped with stainless steel hinge pins. All doors are double paneled and have die-formed water traps to keep compartments weatherproof. Designed for mounting on any standard chassis, units are available in fully enclosed panel bodies with permanent roof or canopy tops for both single and dual wheel chassis. Overall body lengths at floor line are 78 to 108 in. Inside floor areas range from 26 to 38 sq ft.

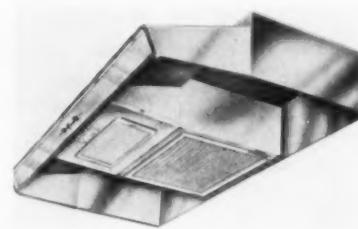
Reading Body Works, Inc., Reading, Pa.

Tape

(9)

A new cable fireproofing tape has been especially designed so that utilities and industries can use it to protect cables in circuits with fast-acting breakers. It is also used as a fireproofing material by other industries. This durability is the result of its high quality asbestos construction and thorough impregnation with silicone. The tape edges are salvaged so that threads cannot pull out and ground water cannot get in. It is also high in water repellance, low in water absorption, resistant to flame, oil, fungus and mold, non-corrosive to cables, non-sagging, non-drooping, and has ample residual strength after burnout. Literature is available.

Johns-Manville Corp., 22 East 40th St., New York 16, N. Y.



Range Hoods

(10)

Series 95 and 93 power range hoods, called "Slim-Line". Both light and ventilating fans are completely built in. Washable filter removes for cleaning. Baked on enamels of white and copper finishes plus stainless steel fits every kitchen decor. Available in 30, 36 and 42-in. sizes. Splash plates available in all finishes and sizes.

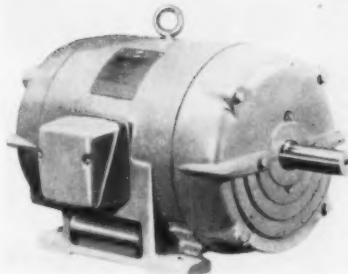
Fasco Industries, Inc., Rochester 2, N. Y.

Heaters

(11)

Two new lengths of electric baseboard heaters—4 ft and 6 ft—have been added to the 2-ft length previously available. Units are installed along the wall in place of baseboards. Maximum temperature of vertical outer surface is just above normal body temperature. A control panel is coupled into the heating system of each room, allowing room-by-room use and conservation of heat. Power requirement is 240 volts ac. Surfaces are of neutral-beige enamel. Units are rated at 250 watts per ft, and are 7 in. high and 2½ in. wide.

Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.



Motor

(12)

A new synchronous induction motor built in the same NEMA frame size as a standard motor of equal hp. Called Synchro-Spede, it is suitable for use on many applications requiring constant speed with varying load. It can be used for constant speed drives in such industries as machine tool, synthetic fiber, plastic, paper, wire-drawing, glass making and printing. As a conveyor drive, the motor makes it possible to have an exact constant-speed or adjustable-speed system from no-load to full-load conditions with a minimum of driving units and controls. It is manufactured in ratings from 1 to 100 hp in any enclosure type and can be foot or flange-mounted. It is designed for horizontal or vertical mounting with a wide range of mechanical modifications available.

Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis.



Contactors

(13)

A new ac magnetic contactor called Type "D", which is available in sizes 0 through 5. All moving and stationary contact surfaces are fully exposed by snapping open contact cover. Coils can be changed by disconnecting the coil leads from terminals and depressing from holder. On contactor sizes 1½ through 5, quenching chutes are used to lengthen, cool and extinguish the arc.

Rowan Controller Co., 2315 Homewood Ave., Baltimore 18, Md.



POWER SYSTEM TREND IS TOWARD INTERLOCKED ARMOR CABLE

Where the ruggedness of rigid conduit is not essential, more and more Utility and Industrial Engineers are turning to Interlocked Armor Cable for power distribution circuits. This new cable can be installed at a much lower first and final cost than conventional systems, both in new circuits and in modernizing existing circuits.

Easier, Faster to Install—Bends easily around corners and obstructions. Simplifies layout—long runs can be installed without splices or pull boxes.

Easier to Tap, Replace, or Relocate—Laid in racks or on hangers, the cable is accessible all along the line.

Smaller Space Requirements—Normally requires about half as much space as cable and conduit.

Choice of Types—Triangle Interlocked Armor Cables are available with a choice of 3 insulations, 3 armors—to match the requirements of the job.

TRIANGLE CONDUIT & CABLE CO., INC.
New Brunswick, New Jersey



Buy Smart — Buy from Your Distributor

Write for Bulletin
IA-10 giving product
and installation
information and
design data.



Cutout

(14)

Extra heavy-duty loadbreak cutout, Tupe DX, features a new eyebolt terminal. Cast of copper alloy, the terminal is tin plated to allow the use of aluminum or copper conductors. It accommodates wire sizes from a No. 6 solid copper to a No. 1/0 stranded SX ACSR. Eyebolt is capable of withstanding 350 in.-lbs on nut with an elongation of 0.0156 in. Terminal has larger surfaces.

Westinghouse Electric Corp.,
P. O. Box 2099, Pittsburgh 30, Pa.



Fixture

(15)

A new fixture has been developed for the commercial lighting field. It is designed to accommodate the 13,250 lumen lamp. Features are 100% shielding by steel reflecting vanes which cannot transmit light. Lamps cannot be seen from below horizontal. 80% efficiency. A completely luminous exterior achieved by a unique arrangement of the reflecting surfaces. It is a 4-lamp fixture.

Leadlight Fixture Company, 300
100th Avenue, Oakland, Calif.

Electric Plant

(16)

New HC Series of water-cooled, revolving-armature 10 and 15 kw electric plants. Series is available in either 10,000 or 15,000 watt, ac sized ranges in voltages to 460 volts. Self-contained, these gasoline engine driven units will pro-

vide full-rated electric power for all types of standby emergency applications in hospitals, institutions, department stores, banks, etc. Prime mover for these plants is the heavy-duty, 41 hp, Continental F-162 engine. Rated for continuous heavy-duty service, the self-aligning generator has a generous overload capacity. It provides voltage regulation of plus or minus 5%, with frequency regulation of three cycles maximum. All Series HC plants are rated at .8 pf, 3-phase; unity power factor, single phase. They are available in all standard ac voltages, 50 and 60 cycle.

D. W. Onan & Sons, Inc., 2515 University Ave. S.E., Minneapolis 14, Minn.



Conductor Systems (17)

New Duct-O-Bar conductor systems for cranes and hoists, designed especially for installations requiring curves, interlocks, etc. "T" shaped, hollow-roller conductors gives added lateral stability. Rigid vinyl non-burn plastic covers assure protection. Unique splicing method eliminates "hot-spots." Available in 100, 175 and 300 amps.

Crane Hoist Engineering Corp., Duct-O-Wire Co., 6515 Salt Lake Ave., Bell, Calif.

Lamps (18)

A new line of Colortone mercury vapor lamps that can be used for practically all general lighting applications. Lamps have a new coating on the outer bulb which produces a light which is flattering to home and office decorations and to complexion. Available in 400-, 700- and 1000-watt sizes. Suitable for use in offices, school rooms, commercial buildings and stores, show windows, floodlighting and luminous ceilings. Colortone lamps will also be suitable for street lighting where extra high quality results are desired.

Westinghouse Electric Corp., Bloomfield, N. J.

BUY ALL TRIANGLE PRODUCTS LOCALLY FROM YOUR ELECTRICAL DISTRIBUTOR

It's smart today to buy all your electrical needs — wire, conduit, cable, switches, fittings — from your nearby distributor. One call shopping saves you time and money.

Your distributor's warehousing saves you countless cubic feet of valuable floor space, and assures you of a constant flow of fresh materials as your schedules demand.

Your distributor gives you

Fast delivery . . . on one item or a hundred—from one manufacturer, or from many.

Simplified bookkeeping . . . one invoice, one statement, one account.

Low inventory cost . . . his stock is your inventory control, gives you working capital.

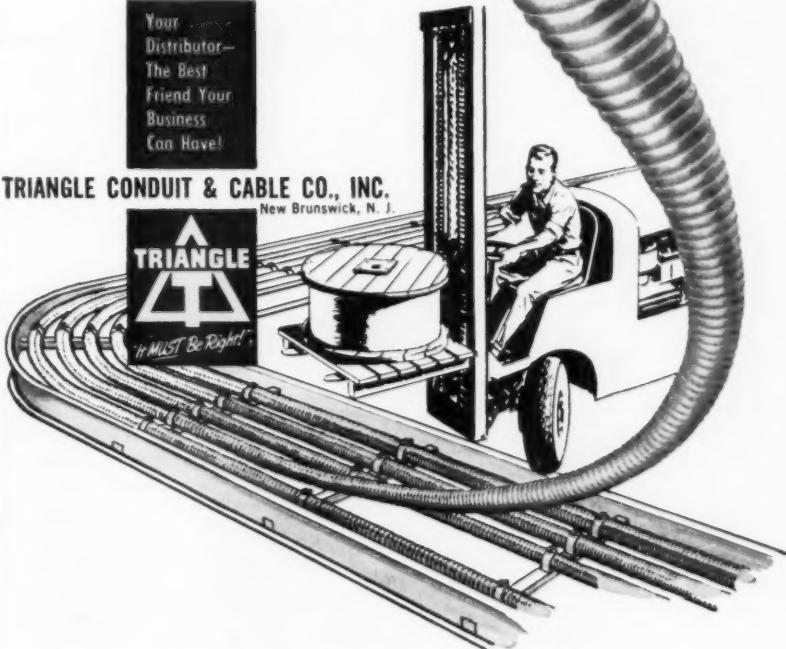
Lower insurance rates . . . less inventory means your flood, fire rates are lessened.

That's why dependable electrical manufacturers advise you to always buy from YOUR DISTRIBUTOR — THE BEST FRIEND YOUR BUSINESS CAN HAVE! He's the one source for everything electrical — and he's local.

Your
Distributor—
The Best
Friend Your
Business
Can Have!

TRIANGLE CONDUIT & CABLE CO., INC.

New Brunswick, N. J.



LITECONTROL'S New-As-Tomorrow Lens Ceiling



*Solves Control Room
Lighting Problem
TODAY*

The Problem:

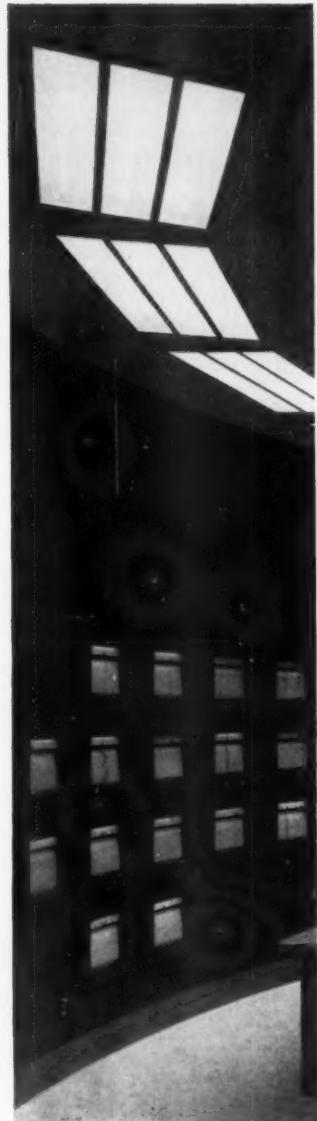
To provide the best possible lighting in quantity and quality for the critical seeing tasks of reading meters accurately over long periods.

The Solution: Litecontrol's standard lens ceiling panels. These were chosen to provide 230 foot-candles of the most comfortable lighting you have ever seen. (The perimeter recessed lighting next to the control board was furnished by the Holophane Company.) This is truly lighting of the future — available today with Litecontrol fixtures, using Holophane's acrylic PRISMALUME lenses.



The luminous ceiling provides high intensity and low brightness far beyond the average lighting job. Combined with high reflectance ceiling, wall, and floor finishes, it reduces contrast to a minimum and, by solving the glare problem, aids work efficiency and comfort. No wonder the installation was a prize winner in the 1957 International Lighting Competition — Electric Utilities Division. Yes, and the operators are enthusiastic, also.

This type of lighting can be used effectively on your next installation — in a control room or elsewhere. Think of LITECONTROL for inexpensive quality lighting for your next store, office, school or other public building job.





Installation: Connecticut Valley Power Exchange, Bloomfield, Conn.
Architect & Engineer: Alderman & MacNeish,
 West Springfield, Mass.

Lighting Consultant: John F. Dougherty, Hartford Electric Light Co.,
 Hartford, Conn.

General Contractor: Industrial Construction Co., Hartford, Conn.

Electrical Contractor: T. J. Martin Electric Co., Hartford, Conn.

Area: System Operators' Room

Finish: Floor — 47% R.F. off white. Desks — gray, mist-gray tops.
 Walls — light tan. Control Boards — medium dark green (for contrast). Distributing tapes — multi-colored. Ceiling — marbleized white.

Fixtures: Litecontrol standard lens ceiling panels with Holophane #6024 acrylic lenses, and F40T12/RS rapid start lamps, 12" on centers.

Intensities: All lamps on —
 Average room intensity 30" from floor — 206 foot-candles
 Average intensity on desk tops — 230 foot-candles
 With half the lamps on, these figures become 120 and 135 foot-candles, respectively.
 Average vertical intensity on Distribution Board, 91.9 ft.-C
 Average vertical intensity on Instrument Board, 89.3 ft.-C
 Variation in readings, 12" intervals down Boards, 81 to 95 ft.-C

Brightness Readings: Across axis of lamps — Lens Ceiling —

15° down from horizontal, 108 foot-lamberts

30° down from horizontal, 276 foot-lamberts

45° down from horizontal, 497 foot-lamberts

Along axis of lamps —

15° down from horizontal, 140 foot-lamberts

30° down from horizontal, 145 foot-lamberts

45° down from horizontal, 158 foot-lamberts



LITECONTROL

Fixtures

KEEP UPKEEP DOWN

LITECONTROL CORPORATION,
 36 Pleasant Street, Watertown 72, Massachusetts

DESIGNERS, ENGINEERS AND MANUFACTURERS OF FLUORESCENT LIGHTING EQUIPMENT DISTRIBUTED ONLY THROUGH ACCREDITED WHOLESALERS

here are 6 good reasons why you
should insist on

SANGAMO HEAVY-DUTY TIME SWITCHES



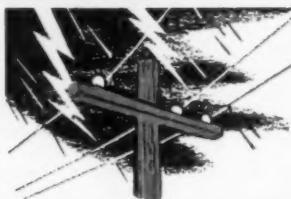
Sangamo Heavy-Duty Time Switches are rugged. They're built to withstand rough handling and to give unfailing on-off control. Rain-tight gasketed case and internal dust cover protect mechanism against adverse weather.

Sangamo Time Switches are precision-built. Long life, slow speed synchronous motor is quiet and specially lubricated to function perfectly in a temperature operating range from -50° to $+200^{\circ}$ F.



Sangamo Heavy-Duty Time Switches are quick and easy to install. There's plenty of inside wiring space and multiple knockouts in sides, back and bottom.

Sangamo Switches equipped with astronomic dials can be set to turn on at sunset and off at sunrise (or earlier) automatically—all year 'round. Dial compensates progressively day by day for season changes.



Sangamo Heavy-Duty Time Switches may be furnished with an optional omitting device which permits establishment of 1 to 6 day weekly operating schedules.

Sangamo Switches with automatic carryover do not have to be reset or rewound after a power outage. Switch keeps running and maintains its accuracy for up to 10 hours, if power fails.

Ask your Electrical Wholesaler to furnish you with all the facts on
how it pays you to standardize on Sangamo
Time Switches.



STSB-1

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Now is the TIME to SWITCH to SANGAMO



Lighting (19)

A newly designed luminaire for outdoor substation lighting. Unit has as a light controlling element a one piece prismatic refractor made of thermally stable glass. A bottom reflector and top cover, both of spun aluminum, together with a threaded collar and fitter of cast aluminum complete the unit. Overall height is 20 in. maximum and 18½ in. minimum; diameter 16½ in. It accommodates 400 or 250-watt mercury vapor lamps or 550-, 300-watt incandescent. Fitter is arranged to slip-fit over 1½-in. pipe.

Holophane Company, Inc., 342 Madison Ave., New York 17, N. Y.



Circuit Breaker (20)

A new heavy duty 800-amp "LM" frame with all of the design and construction features previously found in the "L" and "M" frame breakers. It is approved by UL throughout its full continuous current range. From a mounting standpoint, it is interchangeable with either the "L" or "M" frame circuit breakers as previously used. "LM" circuit breakers are supplied with interchangeable trip units with continuous current ratings ranging from 125 amps to 800 amps. NEMA interrupting ratings are 50,000 amps, 240 volts, 35,000 amps at 480 volts, 25,000 amps at 600 volts, all ac; and 20,000 amps at 250 volts dc. The "LM" may be used as panelboard main breakers,

in power panels, switchboards, motor controls, bus duct plugs, and individual enclosures. Pressure connectors are available for either single, double, or triple cable connections in each phase.

*I-T-E Circuit Breaker Company,
19th and Hamilton Sts., Philadelphia 30, Pa.*

Insulating Varnish (21)

Class F insulating varnish is designed to meet high temperature requirements, 155° C. It permits designers to take full advantage of the high thermal resistance of Alkanex wire enamels. The specially-modified, polyester-type varnish cures to a tough, flexible film with good adhesive and electrical properties and resistance to oil, moisture and acid. It is compatible with most materials found in electrical equipment and is supplied in a solvent. Typical applications include treating of transformers, magnet coils, stators, fields, low-speed armatures, railway field coils, bare copper coils and other uses under elevated temperatures where high bonding strength is not a prime consideration.

General Electric Co., Schenectady 5, N. Y.



Circuit Breaker (22)

A plug-in type, fully magnetic circuit breaker known as the "MP" has been announced. Breaker can be plugged in with one hand. Metal jaws on one end which grasp busbar are recessed. Breaker can be reset immediately after tripping. Available in ratings from 15 through 50 amps. A complete line of "MP" load centers with from 2 to 42 circuits has been designed to carry new breaker.

*Murray Manufacturing Corp.,
1250 Atlantic Ave., Brooklyn 16,
N. Y.*

YOU SAVE 2 WAYS WITH the right control

There is a right control for every job. By using Furnas Electric controls, cost and space advantage can be yours. Designed for the motor, these controls can save you up to 25% in cost and 40% in space.



Furnas Magnetic Starters are available through Size 4 in 10, instead of the usual 5, different sizes from 1 to 100 hp. This provides "In-Between" sizes, not otherwise available, at corresponding price and space advantages.



Drum Controllers—over 1000 models available from 1 to 10 hp for whatever application you require. The durability, ease of operation, versatility and low cost of drum controllers make them adaptable to the majority of applications satisfied by manual control.



Oil Tight Push Buttons for every need. Standardization and interchangeability mean more combinations with fewer parts. Complete accessory line.



Pressure Switches



Limit Switches



Foot Switches

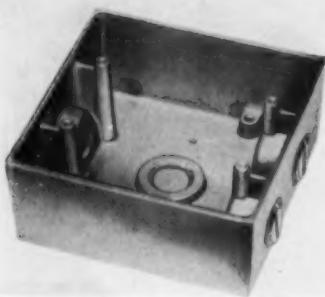
For more information write for Bulletin 5411E,
1067 McKee Street, Batavia, Illinois

A35



FURNAS ELECTRIC COMPANY
BATAVIA, ILLINOIS

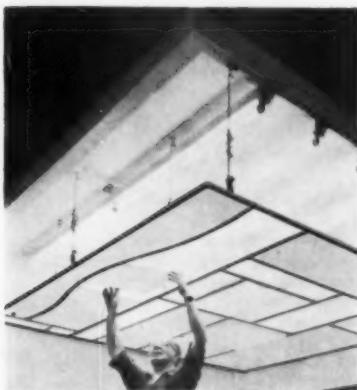
SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

**Outlet Box**

(23)

A newly designed, 2-gang weatherproof cast aluminum box available with three, four or five $\frac{1}{2}$ -in. or $\frac{3}{4}$ -in. tapped holes. New LT-11 Series box is suitable for use with all standard weatherproof devices, lampholder plates or, when fitted with blank cover and gasket, as a junction box. It may also be had with grounding lug and screw. It measures $4\frac{1}{16}$ in. by $4\frac{1}{2}$ in. by 2 in. Comes complete with two aluminum plugs. UL approved.

Perfect-Line Mfg. Corp., Old Country Road & RR Ave., Hicksville, N. Y.

**Lighting System**

(24)

A new concept in overall lighting, called the LumenArea Ceiling System, has been introduced. It allows unlimited effects with standard parts, and introduces the colored Polycube over-lap-reverse-interlock plastic louver. The ceiling may be used as a source of light and at the same time create whatever atmosphere is desired. Lumen-Area uses a system of slide adjustment and adjust-lok hanging devices. The slide fittings are used on the straight as well as curved T-tracks. The hanger assembly slides anywhere—to bypass beams, ducts, or pipes. The adjust-lok allows quick leveling adjustment as well as any plenum depth desired. Adjusts to hang on beams and ceil-

ings in the same installation. Uses lay-in type diffusing media for easy and quick installation. Lamp changing is done by removing the 2-ft lay-in panels.

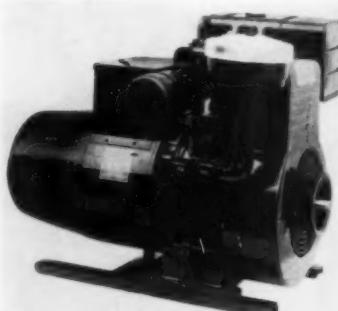
Electro Silv-A-King Corp., 1535 South Paulina St., Chicago 8, Ill.

**Batteries**

(25)

A new line of light-weight, space-saving stationary batteries for switch gear, alarm system, telephone, control, signaling, emergency light and other applications where batteries are used as standby by emergency power. Available over a wide capacity range—from 40-amp hours to 960-amp hours, the new line of Plante batteries is designed to full float service. A Plastrite jar, permits increased battery room capacity and reduces storage rack requirements.

Gould-National Batteries, Inc., Trenton 7, N. J.

**Electric Plant**

(26)

A new Model 40-A electric plant that offers 120 or 240 volts or a combination of both. 12-volt windings are included as standard equipment on the new plant. Model 40-A is a 4,000-watt generator, and weighs 230 lbs. Engine is 4-cycle and has automatic spark advance. Literature is available.

Gen-A-Matic Corp., 14741 Bessemer St., Van Nuys, Calif.

BRONCOCERTIFIED **66** TYPE W

quality flexible electrical cable

... BUILT FOR RUGGED,
CONTINUOUS HEAVY DUTY

JACKET is certified by a registered professional engineer to contain not less than 67.32% Neoprene. A signed certification is affixed to each reel. This great quantity of Neoprene gives maximum protection against oil, ozone, sunlight, acids and alkalis.

BRANDED with complete data—name, type, size, number of conductors, rated voltage, "P116BM"—every two feet, exactly; making it the only cable that is self-measuring.

SYNCHRO-CURED—vulcanized by the exclusive patented BRONCO process—for long service life and maximum flexibility.

LARGE CABLES—Bronco 66 Certified Type W is available in cable sizes as large as 4/0! Made in 600 volt and higher voltage types.

APPROVED... bears symbol "P116BM" which denotes approval by the Pennsylvania Bureau of Mines and acceptance for listing by the Federal Bureau of Mines... meets specifications of the A.S.T.M.,... has been awarded approval certifications by the Canadian Standards Association.

ORDER THE LENGTH YOU REQUIRE. IT WILL BE SUPPLIED AT NO ADDITIONAL COST.

SALES OFFICES IN ALL PRINCIPAL CITIES

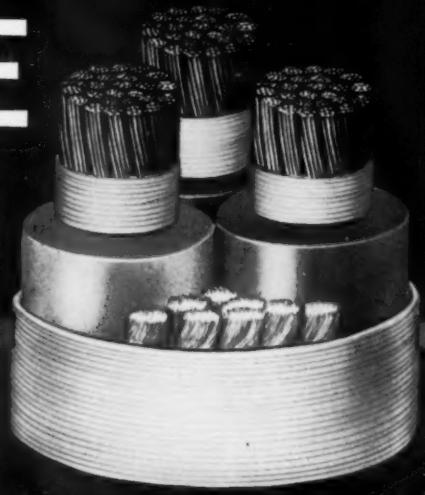
16 LOCAL AND 3 CENTRAL SERVICE CENTERS THROUGHOUT THE COUNTRY OVERNIGHT SERVICE TO ANY CITY IN THE COUNTRY

WESTERN INSULATED WIRE CO.

America's fastest growing specialist manufacturer of portable electrical cords and cables

LOS ANGELES 58, CALIFORNIA

HEAVY DUTY TYPE W



*portable
electrical
CABLE
with
67.32%
NEOPRENE
jacket*

BRONCO
CERTIFIED 66



This plant took to the air to get

ANACONDA 3/c 500 Mcm 5kv shielded Aerial Cable being pulled at large midwest plant. Cable was installed on steel towers leading from substation to plant facilities.



new power fast —at low cost

Installed Anaconda 5kv Aerial Cable

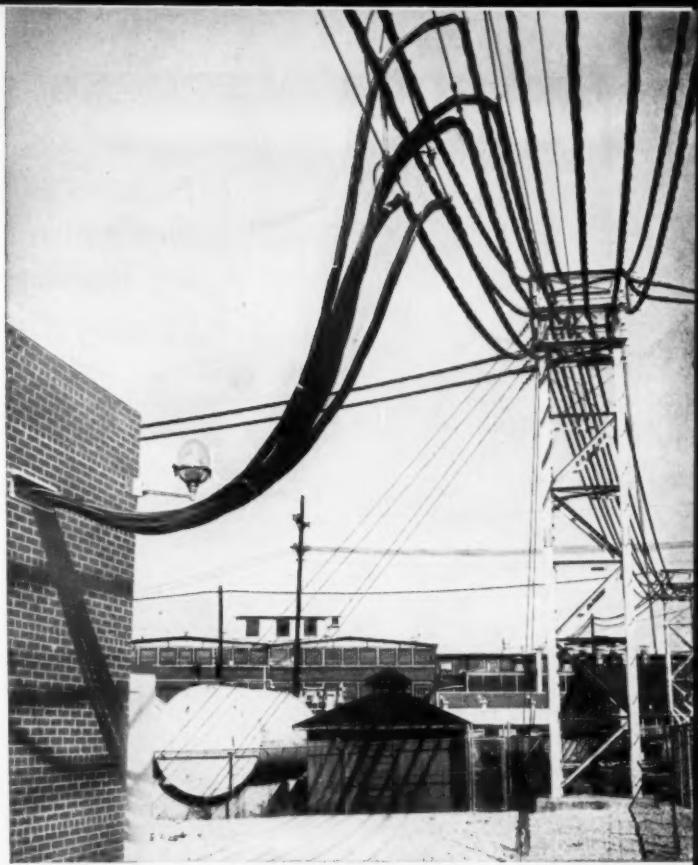
First, this major manufacturer looked at original costs. Then upkeep. And like so many others today, decided on Anaconda Aerial Cable for their new high-voltage distribution system.

Look how it paid off! Easy splicing, tapping and terminating simplified installation . . . reduced time and labor. There was no ditch to dig or fill. No underground pipes or structures to dodge. And no ducts, crossarms or insulators were needed. Their aerial cable is always handy for maintenance. And it's safe, neat.

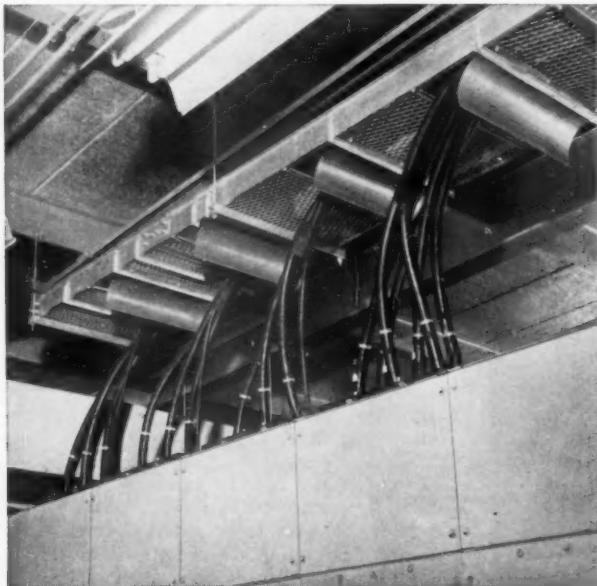
Finest Aerial Cable. Anaconda Aerial Cable is made with tough neoprene jacket that offers highest resistance to weather, corrosive atmosphere, sun. Special Anaconda Type AB butyl insulation gives extra protection against ozone, heat and moisture.

For the full story on aerial cable, call the Man from Anaconda or your nearest Anaconda distributor. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

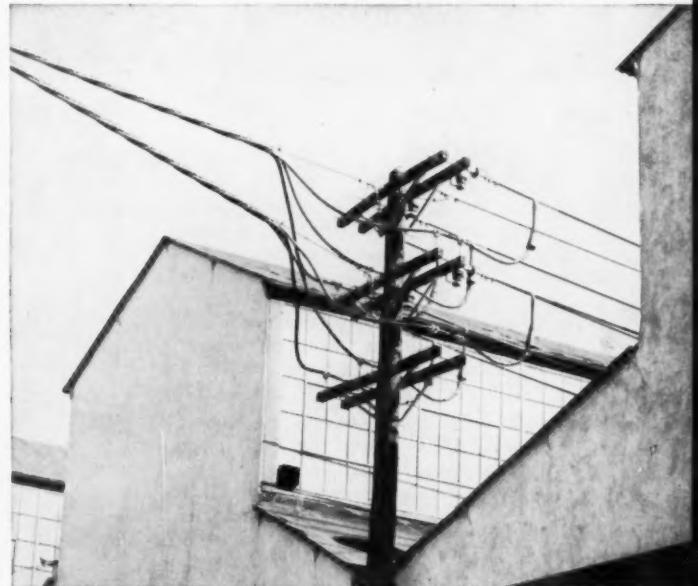
87329



TWELVE CABLES were installed to serve plant. Here, cable drops off messenger to substation entrance.



INSIDE THE SUBSTATION, cables are laid in overhead aluminum racks, then terminated in switch gear.



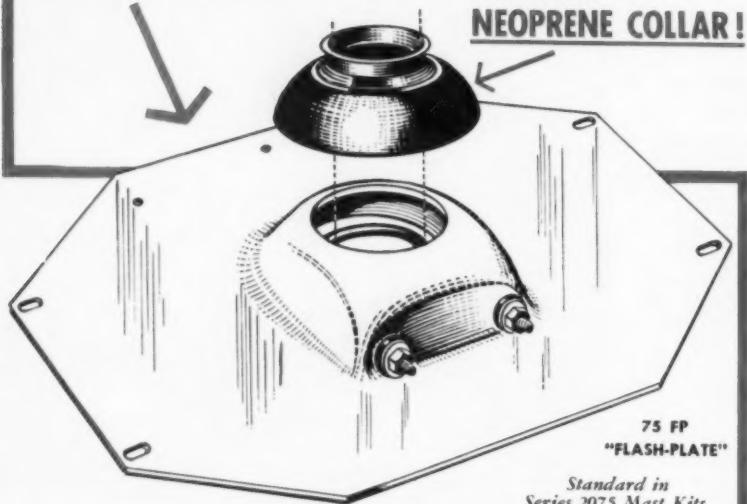
TWO OF THE 12 CABLES branch off to serve separate building. Aerial cable is terminated at pole structure.

See the man from **ANACONDA®**
for **AERIAL CABLE**

new

from
Porcelain Products ...
combination roof-plate
and flashing with

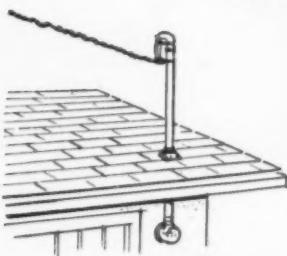
NEOPRENE COLLAR!



Standard in
Series 2075 Mast Kits

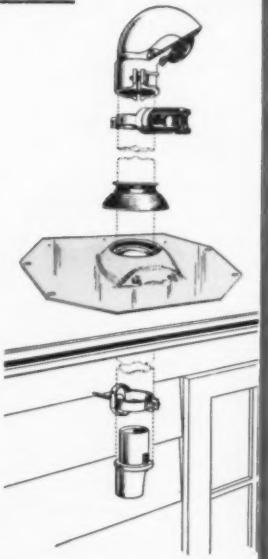
Makes installation

- **QUICKER**—fewer parts
- **EASIER**—no caulking
- at Less Cost!**



Now, Porcelain Products Mast Kits feature FLASH-PLATE, a combined roof-plate and flashing, plus a lifetime, watertight Neoprene collar. The "one-piece" feature makes Porcelain Products Mast Kits easier to install . . . provides a stronger, longer lasting, safer entrance mast . . . **ALL AT LESS COST TO YOU!**

Flash-plate is heavy, 14 gauge galvanized plate. It supports a 2" or 2½" mast on any roof, neatly and effectively, *with no caulking needed*. Write today for further information and free quantity of installation instructions.



ELECTRICAL PORCELAIN SINCE 1894

64
years

Porcelain Products, Inc.
FINDLAY, OHIO

PP
INC.



Switch

(27)

A new master-selector switch controls up to 12 lights or outlets with two separate On and Off knobs. To select a particular light or outlet, either the On or Off knob is rotated to the circuit number desired and then pressed to operate the low-voltage relay of the remote-control wiring system. For master-control of all 12 lights, the knob is first pressed and then rotated through all 12 positions. Adjustable light is incorporated in the plastic wall plate to permit locating the switch in the dark as well as reading the directory of lights, rooms, and areas that show through the clear-plastic windows of plate. A dimmer control for the light is located beneath the Off knob so that the homeowner can change the light intensity to suit any requirement.

General Electric Co., 95 Hathaway Street, Providence 7, R. I.



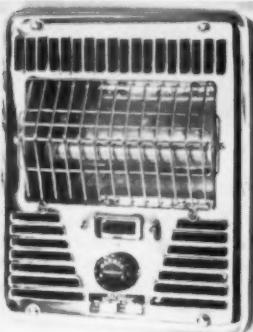
Switch

(28)

New 200-amp raintight door-operated fusible main service switch. It is a 3-pole, 2-fuse, solid neutral, 120/240 volts, ac door operated switch. Cabinet is built of special rust resisting steel and covered both inside and out with baked, blue-gray enamel. It comes equipped with a 2-in. hub. Equipment has the "door-in-door" construction; the main door shields all live parts.

and is mounted on the side with sliding hinges which can be sealed or padlocked. The small door inside operates the switch and when open is in "off" position and fuses are dead. Listed by UL.

Wadsworth Electric Mfg. Co., Inc., Covington, Ky.



Heater

(29)

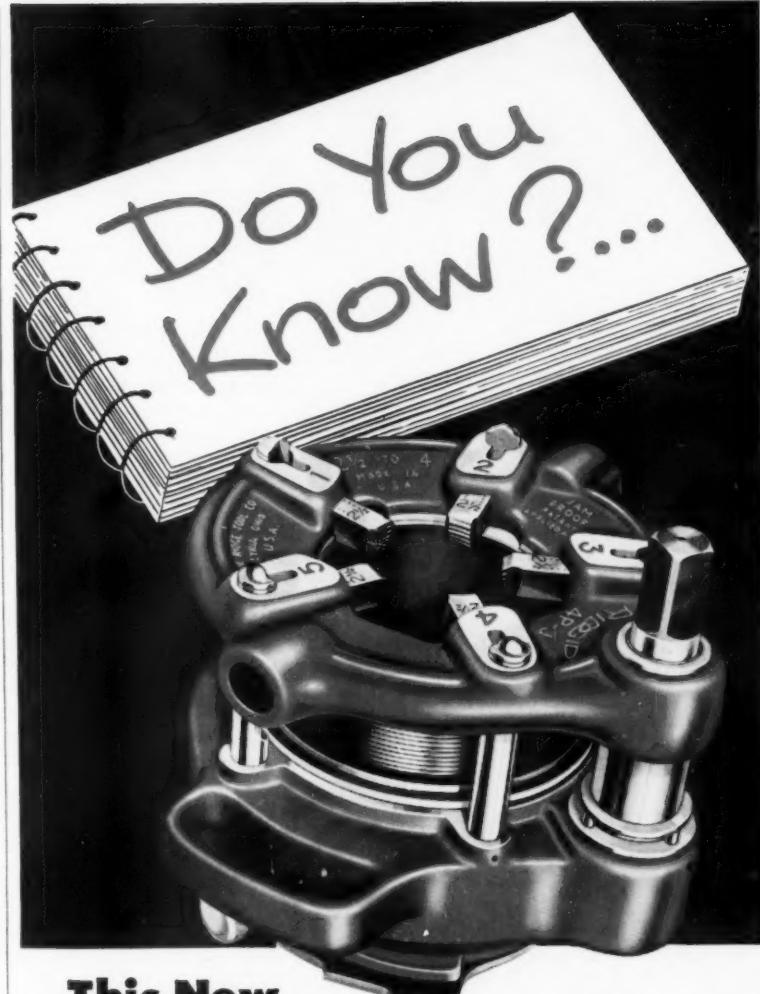
A new electric built-in wall heater, called Space Saver Radiant Heetaire, has been developed. The front measures 10½ in. by 8½ in. Rated 660 watts, it heats up to a 9-ft by 6-ft room. It fits between 2-in. and 4-in. walls. Made in two sizes, boxes are 1½ in. deep; front extends 2 in. from wall, and 3-in. deep box; front is flush to wall. Finished in polished chrome with aluminum reflectors, units have the Neo-Glo heating elements. Easy to install in new or old walls.

Markel Electric Products, Inc. and LaSalle Products, Inc., Buffalo, N. Y.

Insulating Compound **(30)**

Voseal electrical sealing compound is an easy-to-handle, high dielectric insulating material used primarily to seal and build-up cable splices. Voseal conforms to irregular shapes, acts as a padding-insulator to round out sharp corners around terminals, connections, busbars and motor lead junctons. Packaged in individual metal containers, each Voseal roll is 1½ in. wide, 5 ft long and 1-in. in thickness. This ribbon form putty-like substance needs only to be wrapped and shaped into place, to fill and seal every hollow or contour. Voseal has an average dielectric strength of 445 volts per mil of thickness and is capable of continuous performance at 160°F. It resists acids and alkalies.

Johns-Manville Dutch Brand Division, 7800 South Woodlawn Ave., Chicago 19, Ill.



This New

RIDGID 4PJ

is the only 2½" to 4"
geared threader that's
Jam-Proof



It's safe—can't jam and knock equipment around when you thread conduit by power drive. Automatically kicks out after standard thread is cut. Work holder sets to size before putting on conduit—other easier work features. See it at your Supply House!

The Ridge Tool Company, Elyria, Ohio, U. S. A.

What is a FAIR PRICE?

To be FAIR, both
your customer and
you must profit.

Since 1926



NATIONAL PRICE SERVICE

suggests fair resale
prices for electrical
materials and tells
you what they cost
from day to day.

• • •

Keep current.

Be FAIR to yourself.

HENDERSON-HAZEL CORP. DEPT. A81
13601 Euclid Avenue, Cleveland 12, Ohio

Please send complete details about
NATIONAL PRICE SERVICE to us
immediately - no obligation.

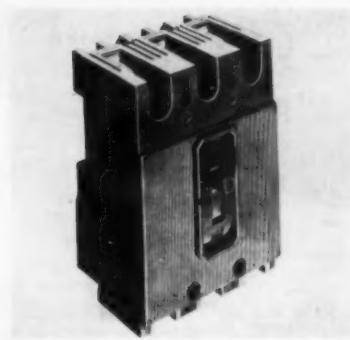
Name _____

Title _____

Company _____

Address _____

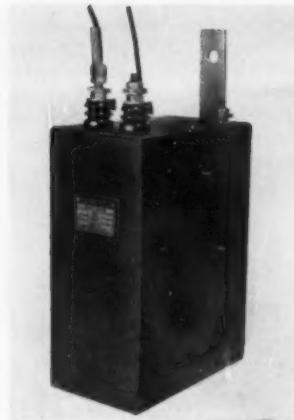
City _____ Zone _____ State _____



Circuit Breaker (31)

New 100-amp molded case circuit breaker, designated "EH" frame circuit breaker, may be used in panelboards, switchboards, load centers and all types of individual enclosures. Common tripping, quick make-break operation and a 3-position operating handle are some of the design features. "EH" frame breakers are available in 2- and 3-pole construction, 10 to 100 amps continuous ampere rating, 480-volt ac, 250-volt dc, and an interrupting rating of 10,000 amps. Breakers meet the requirements of Federal Specifications WP-131A as Class C1, C2, and C3 breakers.

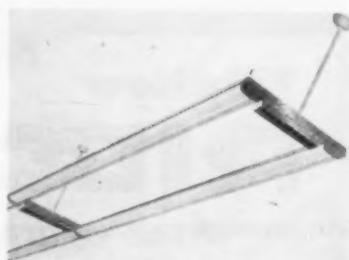
I-T-E Circuit Breaker Company,
19th and Hamilton Sts., Philadelphia 30, Pa.



Capacitor (33)

A new 10-kvar, single-phase, 240-volt secondary capacitor, Type FPS, is contained in a rectangular steel case with zinc spray finish. A ground stud is welded to top of case. A new set of mounting brackets provides for direct pole mounting. The weight of capacitor combined with bracket design keeps unit securely in place on pole during normal operation but permits easy removal. Weight is 56 lbs. Case, not including terminals, measures 13½ in. by 6 by 10 in.

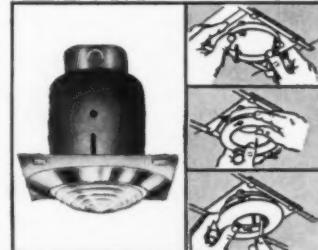
Westinghouse Electric Corp.,
P. O. Box 2099, Pittsburgh 30, Pa.



Lighting System (32)

New "Sightline", 2-lamp suspended indirect lighting system has been announced. Uniform brightness ratios of new "Sightline" create the illusion of a luminous ceiling. They were achieved by an ingenious balancing of downward and upward components of light in conjunction with a scientifically devised V-shaped slotted reflector. Features include minimum use of cross-channels in the design. They are spaced 8 ft apart; also serve as ballast housing. While basically designed for continuous rows, may also be mounted individually.

Sunbeam Lighting Company, 777
E. 14th Place, Los Angeles 21,
Calif.



Fixtures (34)

A new line of "Hi-Hat" round recessed fixtures features a new mounting method called "T-N-T" (Twist-N-Turn). A special plaster ring, with bar hangers, is installed before finish plaster. Ring holds housing by means of three screws, which adjust automatically to any type of thickness of ceiling. They can be used in new construction or modernization work. In wood ceilings, fixture can be installed without plaster ring by using three wood screws. Available in a wide variety of styles, both 750 and 150-watt, for every type of installation. Catalog is available.

Markstone Manufacturing Co.,
1531 North Kingsbury St., Chicago
22, Ill.

From **SOLA...**

The originator of the constant-wattage mercury lamp transformer

a new,
totally new
mercury lamp
transformer
design

totally new *in circuit*

A low crest factor of lamp current is now less than 1.7, resulting in additionally extended lamp life

totally new *in weight*

Now a transformer that is 20% lighter than before, making it easier to handle, install, and transport

totally new *in size*

A 25% reduction in size—three inches shorter—makes it easier to mount, especially in pole-bases

totally new *in regulation*

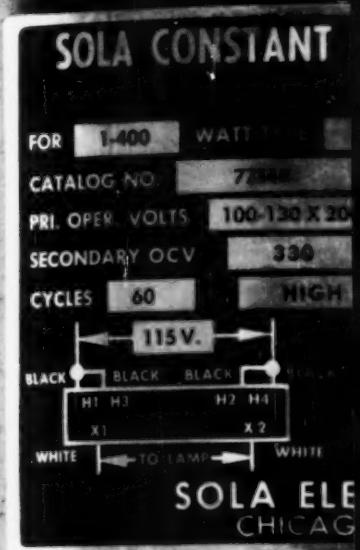
Now you get regulation as close as $\pm 1\%$ even when line voltage fluctuations are as great as $\pm 13\%$

totally new *in efficiency*

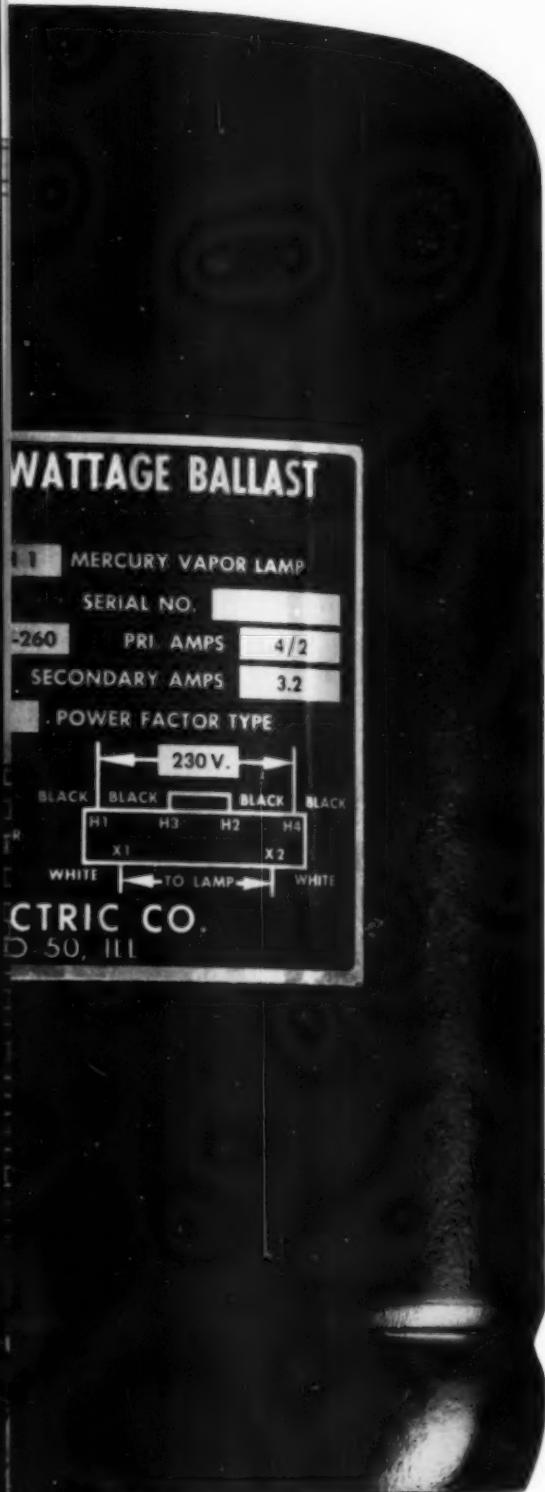
An outstanding efficiency of 89.2% insures less consumption of current and lowers lamp operating costs

totally new *in housing*

New type hydraulic sealing method makes this transformer completely weatherproof and water tight



actual size



actual size

***Under the most severe
conditions . . . constant-wattage
for one H-1 400-watt mercury lamp***

totally new in circuit

Low crest factor (peak/rms ratio) of lamp current is less than 1.7, with lamps mounted either vertically or horizontally, additionally extending lamp life. Open circuit voltage over entire primary range is 300 volts minimum. Positive starting down to -30° F.

totally new in weight

20% less weight than before. With a reduction in weight of from 42 to 34 pounds, handling during shipping and installation is easier. Lower weight also results in less load on lighting poles when the transformers are mounted aerially.

totally new in size

25% smaller than before. A 3-inch reduction in the transformer's length facilitates mounting, especially in the bases of poles. The smaller size, in combination with lighter weight, speeds handling and mounting, and reduces shipping space and costs.

totally new in regulation

You get lamp wattage regulation as close as $\pm 1\%$ even with line voltage fluctuations as great as $\pm 13\%$. The line current never exceeds normal operating current under any conditions. The primary voltage must drop 30% from nominal before the lamp extinguishes.

totally new in efficiency

A Sola-engineered new circuit design gives an improved efficiency rating of 89.2% with only a 50-watt loss through the transformer. This lower loss means less total wattage consumption and less operating cost for the mercury lighting system operation.

totally new in housing

The housing has a unique hydraulic-pressed mechanical closure which is completely solder-sealed. Special neoprene-coated leads are brought out through a neoprene gasket in the threaded nipple. This makes the transformer absolutely weatherproof and watertight.

The Sola transformers described are made under one or more of the following U.S. Patents: 2,346,621; 2,582,291; 2,806,199 and Patents Pending, and Canadian Patents: 399,701; 439,590 and Patents Pending.

Catalog No.	77140
Lamp	1, H-1, 400-watt mercury lamp
Primary Volts	100-130 x 200-260 volts, 60 cycles
Primary Current	4.2 amps
Open Circuit	330 volts
Lamp Current	3.2 amps
Power Factor	90% min. over entire range
Watts Loss	50
Weight, lbs.	34
Case Dimensions	6½" Diam., 9" Height, excluding Nipple & Leads

*Designs available for primary voltage ranges of 240-315 and
400-520 volts.*

SOLA *Mercury Lamp*
TRANSFORMERS

Sola Electric Co., 4633 West 16th Street, Chicago 50, Illinois, Bishop 2-1414



Capacitor Hanger

A newly designed, six unit hanger for 25 or 50 kvar capacitors 7960 volts or less. Constructed of corrosion resistant material, the hanger is designed for easy mounting direct to a pole. Hanger includes two sections—a welded triangular shaped bracket, and two mounting angles. After bracket has been fastened to pole, units can be secured to two mounting angles, and cable connections made between units while assembly is still on the ground. Assembly with capacitors can then be bolted on pole.

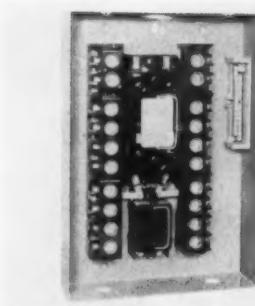
General Electric Corp., Schenectady 5, N. Y.



Motors

A complete line of totally-protected, Series "D" ac motors in the new, large NEMA Frame 364U through 445U. Foot mounted and footless horizontal models in the 360 frame diameter are stocked in all standard enclosures protected; totally-enclosed, fan cooled; corrosion-proof; and explosion-proof—for operation on 208- through 550-volt in-plant ac. In NEMA electrical Design B, C and D, the new line of large-frame motors may be specified in many speeds with Class "A", Class "B" or high-temperature Class "H" insulation. Protected enclosure, with a 40° temperature rise, is designed for applications which formerly called for splash-proof motors. "Metermatic" lubrication gives a metered flow of lubricant to the bearings as needed to eliminate over-greasing or under-greasing.

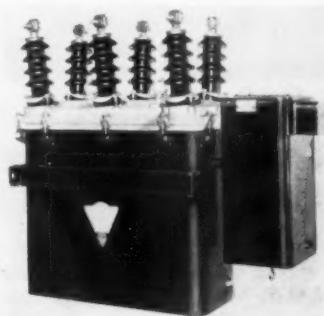
Reliance Electric and Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.



SE Panel

A new service entrance panel featuring a 100-amp main pullout disconnect with 8 to 20 circuits. Available with or without a 60-amp pullout. Main pullout is series connected and controls all branch circuits. Sub-feed lugs are supplied for future expansion of additional 240-volt service. Main pullout is two blade with knife type reinforced fuse clips. Available with surface or flush covers.

Murray Manufacturing Corp., 1250 Atlantic Ave., Brooklyn, N. Y.

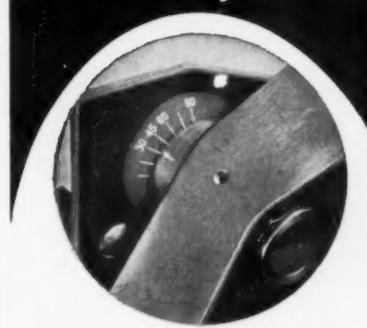


Oil Switch

A new 400-amp, 3-phase oil switch which limits high-frequency inrush currents caused by step-switching of capacitors. Designated VCR, it is rated at 15 kv and 110 kv BIL. It has a motor-driven mechanism for remote electric operation. Feature of switch is ability to energize large installations of capacitors in convenient blocks. Resistors, placed in series with arcing contacts of VCR unit, limit magnitude of high-frequency transient currents caused by energized capacitors attempting to discharge into immediately adjacent de-energized capacities. VCR switch are applicable to systems with phase-to-phase ratings of 14.4 kv and below, and switch 300 amps of capacitive current.

Line Material Industries, McGraw-Edison Company, Milwaukee 1, Wis.

Make accurate Repeat bends Easily!



EXCLUSIVE CALIBRATED DEGREE SCALE ELIMINATES GUESSWORK

SMOOTH UNIFORM BENDS

Repeat bends, as well as smooth offset and 180° bends, are easy and fast to make. When using a "Chicago" pipe bender you always turn out professional work quickly without any special skill. The accurate bending sector does the work and supports the full length of bend.

RUGGED...PORTABLE

An occasional drop of oil on the powerful toggle-ratchet mechanism is the only maintenance required. There are no loose parts to be misplaced or lost. Its light weight, 66 lbs.* makes it a real on-the-job tool...always at a comfortable working height.

*No. 1—66 lbs.
No. 2—89 lbs.

Illustrated...
No. 2 for bending
1" to 1½" conduit



WRITE FOR
FREE
ILLUSTRATED
FOLDER



Send to:
Lidseen of No. Carolina, Inc.
1050 First Street, Hayesville, N. C.

NAME _____

COMPANY _____

ADDRESS _____

CITY _____



TIME FOR DRILLING 3½" HOLES THROUGH 10" REINFORCED MERAMEC GRAVEL CONCRETE FLOOR CUT FROM 6 HOURS TO 30 MINUTES

JOB: Cut 150 holes 3½" diameter through 10" concrete floors for new conduit feeders in the warehouse section of the old Mart Building, now the St. Louis Area Support Center, St. Louis, Mo. The Building, constructed in 1932, was built of concrete containing Meramec gravel aggregate—"the next thing to flint". Chiseling these holes would have resulted in jagged and uneven holes, much dirt and noise, a big clean-up job and much patching to finish up the job and would have averaged six hours each for two men.

CONTRACTOR: The Sachs Electric Corporation, St. Louis, Mo.

TOOLS: Model C Truco Diamond Drilling Machine with 350 rpm motor and 3½" O.D. Truco Diamond Drill Bit.

DESCRIPTION: Truco unit was used mounted on its mobile base and moved to location on its rubber tired wheels. Actual drilling time on each hole was from 6 to 9 minutes depending upon the number of reinforcing rods to be cut. Each completed hole averaged 30 minutes including all moving, set-up and core removal. (Compare with previous 6 hours for two men with air hammers.) Completed hole was clean and smooth and no patching needed. Truco unit is completely portable by one man and is designed for high speed drilling in practically any location. Wired for 110 V, 60 cycles or less.

See our Exhibit at Booth 464, Plant Maintenance Show, Chicago

WRITE FOR NAME OF NEAREST DISTRIBUTOR

Truco Swivel Division

WHEEL TRUEING TOOL CO.

21-3200 W. Davison Ave. • Detroit 38, Michigan

Lamps

(39)

All circline fluorescent lamps have been converted to the rapid-start design. The change was made possible because ballast manufacturers are now making rapid-start ballasts for the 8½-in. (22-watt) and the 12-in. (32-watt) circline lamps as well as the 16-in. (40-watt) lamps. Lamps will be available in all the existing colors and also the new "Beauty Tone" home-line color. Home-line fluorescent lamps are designed especially for household use.

Westinghouse Electric Corp., Bloomfield, N. J.

Varnish and Enamel

(40)

An electrical insulating varnish-wire enamel system which will withstand hot spot temperatures of 180°C yet can be applied and cured at conventional temperatures. System is made possible by a new wire enamel and a new insulating varnish. Designated as Isonel No. 175 wire enamel and Isonel No. 31 high bonding insulating varnish, they are both polyester-type materials, capable of operation at Class F temperatures of 155°C. Used together, however, they complement each other and make possible sustained operation at 180°C. They can be used for Class A, Class B or Class F applications. Because of their heat resistance and excellent adhesion, the new enamel and varnish are well suited for use in motors and generators which operate at high speed.

Schenectady Varnish Company, Inc., Schenectady, N. Y.

Rectifiers

(41)

A new line of general purpose 250-volt silicon power rectifiers are applicable for general industrial service where 250-volt dc power is required for the operation of cranes, elevators, machine tools, lighting, magnetic chucks, and similar dc loads. Units are available in ac input ratings under 600 volts, 3-phase, 60 cycle. They are rated for dc outputs of 75 through 600 kw for 2-wire 250-volt systems. For 3-wire 125/250-volt systems, they are rated for dc outputs of 75 through 150 kw. A dc circuit breaker, selected to coordinate with the overload ability of silicon rectifier cells and protective fuses, provides protection against dc overloads and short circuits.

General Electric Co., Schenectady 5, N. Y.

CATALOGS and BULLETINS

(42) CRIMPING TOOL for conductors ranging from AWG 8 to 4/0. 4-page bulletin describes tool for crimping ring and flag tongue connectors and terminals. American Pamcor Inc.

(43) CONVERSION FACTORS, listed in handy wall-chart form, include common conversions such as watts to horsepower, etc., and many more difficult to locate in other sources. Precision Equipment Co.

(44) DC CRANE CONTROL. Bulletin GEA-6435A, 8 pages, describes new line of front-connected control panels, including typical speed-load and torque-speed performance curves. General Electric Co.

(45) LIGHTING DIMMER for incandescent or fluorescent lamps. New data sheet covers new Luxtrol control rated at 750 watts, giving complete dimensions and wiring diagrams. Superior Electric Co.

(46) LOW-VOLTAGE SWITCHGEAR, ranging in unit ratings from 225 to 4000 amperes. Application tables provide complete breaker ratings, control-power requirements and ranges of overcurrent trip devices. Bulletin 6004-C, 20 pages. I-T-E Circuit Breaker Co.

(47) CEILING LIGHTING SYSTEM. Large-area fluorescent system providing flexibility in combining louvers, molded forms, glass or accent lighting is illustrated and described in new 8-page bulletin L/A-1. Electro Silv-A-King Corp.

(48) SYNCHRONOUS MOTORS. 8-page Bulletin GEA-6620 gives features and applications of large high-speed synchronous motors rated at 1500 hp and up. General Electric Co.

(49) CAPACITORS for motor starting and running circuits. Two 4-page bulletins cover stock items for air-conditioning, heating, ventilating and other motor applications. Aerovox Corp.

(50) LIGHTNING ARRESTORS — intermediate class Type F in ratings from 20 to 73 kv. Bulletin LA4 includes complete tables of impulse sparkover voltages and discharge voltages. Line Material Industries.

(51) TRANSFORMER ENGINEERING manual on four series of dry-type distribution transformers: 3 to 10



New No. 5442 Ultra-Lite. Four mercury luminaires are tilted 15° for improved high level, uniform light distribution. Lamps and Alzak aluminum reflectors are housed under modern parabolic dome of spun aluminum.

Revere Ultra-Lites

The newest approach to large area mercury lighting

Wide Area Coverage — Ultra-Lites are designed for illuminating large outdoor areas. Parking lots, shopping center plazas, playgrounds, parks . . . wherever wide horizontal coverage is needed, Ultra-Lites qualify as an efficient and economical lighting answer.

More Uniform Lighting — Ultra-Lite mercury luminaries are engineered to produce a square light pattern which provides greatest light uniformity. Patterns overlap, eliminating "dark spots."

Ultra-Lites Set a New Pace in Styling — Whether used in an original installation or as replacement for obsolete lighting equipment, Ultra-Lite's modern, dramatic appearance adds a striking atmosphere to any area.

Pole Requirements Reduced 50% to 75% — Wide coverage of Ultra-Lites require fewer poles per installation. Result: lower installation costs, less installation time. Maintenance time is reduced.

For further information on Revere's Ultra-Lites and their applications in outdoor lighting, write for Bulletin 400-13.

The logo for Revere Electric Mfg. Co. features the word "Revere" in a stylized, italicized font. Below it, "ELECTRIC MFG CO." is written in a smaller, sans-serif font.

Revere Electric Mfg. Co.,
6009 Broadway, Chicago 40, Ill.,
UPtown 8-7100

Available in Canada thru Curtis Lighting, Ltd.,
Leaside, Toronto, Ontario

OUTDOOR LIGHTING: Industrial • Commercial • Service Stations • Streets • Sports • Airports • Shopping Centers

NOW! STRIP UF CABLE

with



"E-Z" AUTOMATIC WIRE STRIPPERS

... as easy to use as your pliers!

With the "E-Z" it's easy to strip the outer sheath and web, then the inner conductors (2 or 3 wire 12 or 14 ga.) from non-metallic sheathed cable — without cutting, nicking or other damage to the wire ends. The "E-Z" Automatic is lightweight yet durable all-steel construction for long, heavy duty service life. Available in 5 other models for stripping various types of wire from 8 through 26 ga.



... and for ordinary non-metallic cable

IDEAL DELUXE CABLE RIPPERS



A practically designed mechanic's tool for quickly and easily ripping the outer sheath from non-metallic covered cable up to $\frac{1}{2}$ " O.D. Faster—just insert the cable, set blade depth and rip away. Rigid frame and cradle assure straight cut. Replaceable steel blade; durable aluminum rip-grip for speed and safety.

Sold through America's Leading Distributors—In Canada: Irving Smith, Ltd., Montreal

IDEAL INDUSTRIES, Inc.
1041-A Park Ave., Sycamore, Illinois
Please send us your catalog on the complete line of Ideal Electricians Tools.

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____



kva, class H insulation; 15 to 112½ kva, class H; 3 to 112½ kva, class B; and 150 to 500 kva, class B. Bulletin 137, 12 pages. R. E. Uptegraff Mfg. Co.

(52) GENERATORS, rotating field design. 2-page Bulletin 1057 describes line of 50 and 60-cycle generators rated from 5 to 100 kw. Kurz & Root Sales & Engineering Corp.

(53) BALLAST REPLACEMENT GUIDE. Cross-indexed chart printed on heavy stock for wall mounting lists more than 120 type numbers, with electrical ratings of ballasts made by five major manufacturers. Universal Mfg. Corp.

(54) TRANSFORMER INSTRUCTION MANUAL presents factual and technical information on dry-type, air-immersed, self-cooled transformers, including complete instructions on installation, care and maintenance. Precision Transformer Corp.

(55) COLLECTOR RINGS, custom-built. Two types of rings are illustrated by new Bulletin 83, with instructions for preparing estimating data. B. A. Wesche Electric Co.

(56) SOLENOID VALVES. 4-page bulletin VS-51 describes 2-, 3- and 4-way, corrosion-resistant, manual-reset and special-purpose valves plus automatic transfer switches, remote control switches, contactors, relays, solenoids and electric plant controls. Automatic Switch Co.

(57) SPEED VARIATORS. Bulletin GEA-6643, 16 pages, describes new line of packaged dc adjustable-speed drives rated from 3 to 150 hp, 220, 440 and 550 volts, 3-phase. General Electric Co.

(58) MI CABLE. 12-page booklet describes applications and electrical and physical properties of Safety Mineral Insulated cable. General Cable Corp.

(59) FLUORESCENT EQUIPMENT catalog, 8 pages, provides descriptions, illumination data and illustrations on commercial and industrial lighting units, recessed troffers and ceiling systems. Smithcraft Lighting.

(60) LIMIT SWITCH with plug-in feature. Bulletin 20 describes basic terminal block unit and five available actuator types available, complete with drawings and photographs. Micro Switch, a Division of Minneapolis Honeywell Regulator Co.

(61) MOTORS AND DRIVES. 12-page Bulletin A-2400 covers integral ac motors to 400 hp, dc units to 1000 hp, dc and ac motor-generator sets, gearmotors, variable-speed drives, and controls. Reliance Electric and Engineering Co.

(62) CONCRETE FASTENERS ranging from $\frac{1}{8}$ through $\frac{1}{2}$ in. are pictured on reference chart to aid selection of proper fastener for each application. Included are diagrams on installation plus pictures of tools. Phillips Drill Co.

(63) AIR CONDITIONERS for perimeter air conditioning of multi-story buildings. 16-page Bulletin 8827 outlines and illustrates features and characteristics of inductor-type units, including step-by-step selection procedure. American Blower Div., American-Standard.

(64) INTERRUPTER SWITCHES. 24-page Bulletin 1610A gives application, dimension and ordering data for frame-mounted, 3-pole, fused and unfused switches, and metal-enclosed switches. Ratings are from 4.8 through 14.4 kv, 600 and 1200 amps. R&IE Equipment Div., I-T-E Circuit Breaker Co.

(65) MATERIALS HANDLING savings through application of metal-enclosed trolley busway are enumerated and pictured in 4-page bulletin. Feedrail Corp.

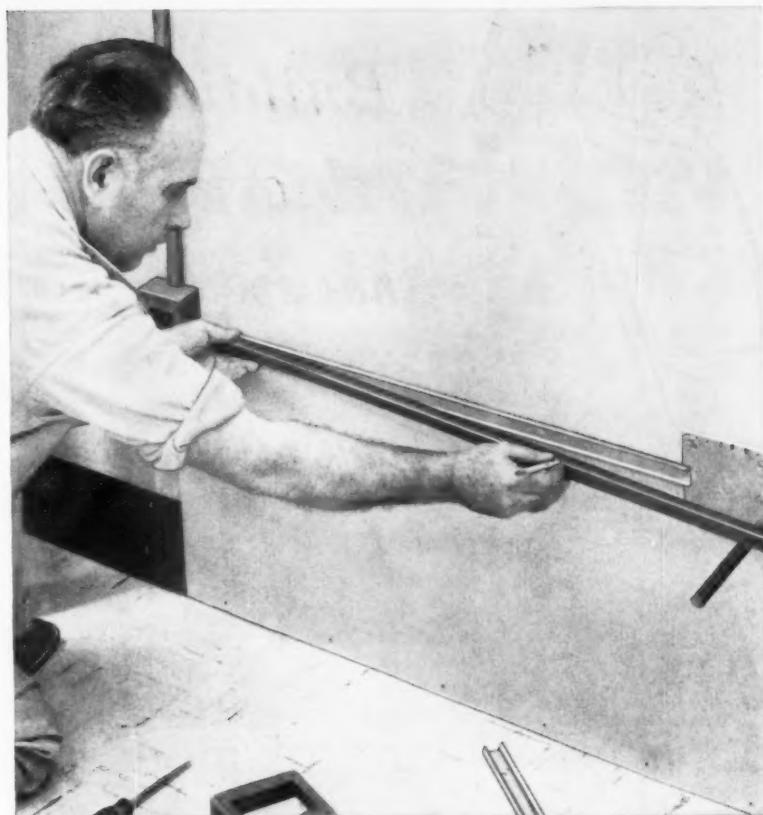
(66) UNDERWATER LIGHTING. Bulletin 2638 describes two types of underwater floodlighting: Type SPS, where passageway or man-hole permits access to lights, and Type RPS, serviced by means of watertight flush floor box. Crouse-Hinds Co.

(67) POLE-TOP CAPACITORS for distribution circuits are illustrated and described in 8-page Bulletin GEA-6657, including ratings, weights and dimensions. General Electric Co.

(68) AC MOTORS. Totally-protected motors, 1 through 125 hp, are discussed in 4-page Bulletin B-2506, including photos and drawings. Reliance Electric and Engineering Co.

(69) CONTROL SWITCHES for use in conjunction with circuit breakers, transformer tap changers, motor-operated rheostats and other equipment are described and pictured in 8-page Bulletin 14B8112A. Allis-Chalmers Mfg. Co.

(70) EMERGENCY LIGHTING systems for schools, hospitals, public



To install NE Metal Molding, just fasten the base, lay in the wires, snap on the capping. There's no fishing necessary and you can make quick changes or additions to the system.

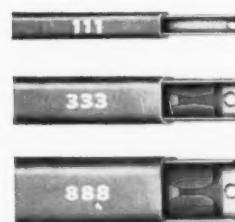
fast to install

NE Metal Molding

In offices, commercial, institutional or industrial locations, National Electric Metal Molding makes wiring modernization fast, attractive, and economical.

Neat, strong, safe, permanent, NE Metal Molding serves every electrical application, 15 to 60 ampere loads.

Try NE Metal Molding on your next modernization job.



Listed by Underwriters' Laboratories

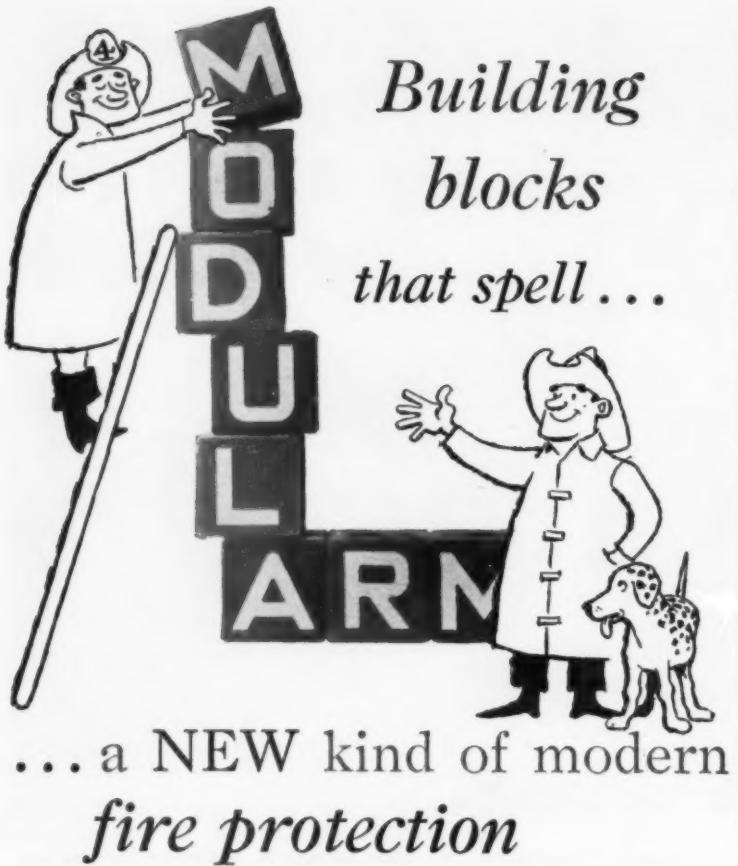
Write for complete details

National Electric Products

PITTSBURGH, PA.

2 Plants • 12 Warehouses • 41 Sales Offices





Modularm is a completely new fire alarm system of building block design. The building blocks are compact, modular units called Alarm Initiating Panels, Alarm Signal Panels, and Power Panels—all standardized and designed for economy. Combined, they produce any of these wide variety of UL-approved systems:

Manual, automatic, and/or pre-signal non-coded systems.

Manual or automatic common-code or zonal code systems.

Manual or automatic selective-code, selective-code continuous-alarm after code, or selective-code pre-signal systems.

Modularm has these additional features—

Provisions for automatic alarm connection to municipal fire stations.

Dead-front design of control panel isolates high voltage, permitting installation anywhere.

Single or double supervised power supply.

Auxiliary test switches—pilot lamps.

Automatic fire detection for non-supervised areas.

Integrated design, easy installation and superior performance make *Modularm* the most modern and complete fire alarm system available today. Write for Couch's Modularm Brochure #131.

Simplified Systems of Communication

S. H. COUCH COMPANY, INC.,
NORTH QUINCY 71, MASS.

Couch

auditoriums, banks, and other commercial, institutional, civic and public buildings. 20-page booklet also includes specifications on all components, fixtures and exit signs. Standard Electric Time Co.

(64) SILICONE PRODUCTS reference guide describes over 150 available silicone products, including insulating systems for electrical equipment. 16 pages. Dow Corning Corp.

(65) FIREPROOFING TAPE for wrapping cables. 4-page bulletin describes tests, lists available widths and weights. Johns-Manville.

(66) CENTRIFUGAL FANS: comparative performance, capacity tables, dimensional drawings, and suggested applications for each model. Bulletin 257, 30 pages. ILG Electric Ventilating Co.

(67) TROLLEY BUSWAYS—do they pay off? 4-page bulletin No. 64, a reprint of a survey among over 2,000 plant engineers, shows how systems reduce maintenance and operating costs, speed production and increase safety. Feedrail Corp.

(68) BALLASTS—installation suggestions and operating characteristics. GET-922J, 16 pages, gives detailed data on fluorescent lamps, starters and ballasts. General Electric Co.

(69) DISCONNECT TOOL, designed to be used with type XS cutouts, is described in 10-page bulletin 731. Loadbuster tool is designed to switch currents of from 100 to 400 amps on 12 and 15 kv. S & C Electric Co.

New Books

Wiring Manual for Home and Farm by A. Carl Bredahl; 236 pages; McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.; \$4.95.

Information on residential electrical systems is brought together for ready application by the electrical contractor, electrician or architect. Methods of computing service entrance and branch circuit requirements are treated in detail. Frequent references are made to National Electrical Code provisions; however, recommendations exceed minimum requirements where necessary to reflect today's practical power needs. Special chapters are devoted to lighting, electric space heating, low-voltage control and communica-

cations systems; remainder of book covers estimating costs, farm electrification and practical wiring installation methods.

Selection and Application of Metallic Rectifiers, by S. P. Jackson; 320 pages; McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.; \$8.00.

Fundamentals, characteristics and applications of metallic rectifiers are presented as a guide for engineers, technicians, plant electricians, etc., in the selection and use of this equipment. After a comprehensive discussion of rectifier circuit theory, individual chapters cover selenium, copper oxide, magnesium copper, and germanium and silicon rectifiers. The final section of the book presents complete data on battery charging, electroplating, industrial power supplies, magnetic amplifiers and special-purpose circuits. Liberal use is made of circuit diagrams and supporting mathematical computations.

Mathematics for Science and Engineering, by Philip L. Alger; 360 pages; McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.; \$6.95.

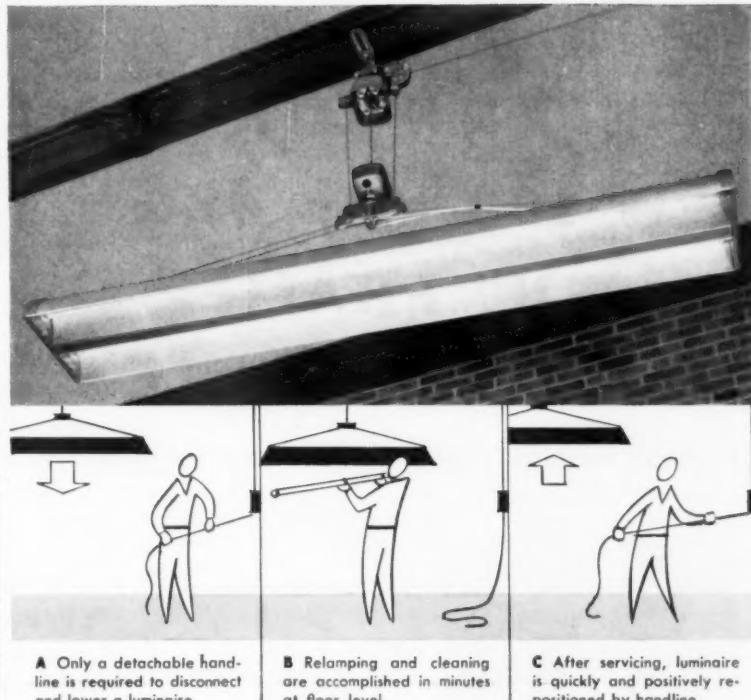
This complete revision of previously published material by the late Charles P. Steinmetz is a practical treatment of about 80% of the mathematical procedures and methods which the practicing engineer or technician will need, ranging from basic arithmetic through linear differential equations. Basic coverage of algebra, trigonometry and calculus make it unnecessary to refer to other texts on these specific subjects; special emphasis is given to complex numbers, infinite series, and methods of approximation. Practical illustrations of mathematical principles are included, and problems follow each chapter.

Handbook of Powered Industrial Trucks; 96 pages; Industrial Truck Assn., Ninth and F Streets, Washington 4, D. C.; \$5.00.

Five sections cover industrial truck applications, cost savings through industrial truck handling, planning for and selection of industrial trucks, engineering data, and future developments. Included are dozens of case studies showing specific materials handling applications; all types of motive power are detailed with information on selecting best type for required operations.

**NOW!... ONE MAN CAN MAINTAIN
HEAVY LUMINAIRES AT FLOOR LEVEL**

WITH **THOMPSON** **TRIPLEX HANGERS**



A Only a detachable handline is required to disconnect and lower a luminaire.

B Relamping and cleaning are accomplished in minutes at floor level.

C After servicing, luminaire is quickly and positively repositioned by handline.

Designed to handle hi-bay luminaires weighing up to 120 pounds, the new Thompson TRIPLEX Hanger is the most practical means of servicing heavy fixtures quickly, safely, economically. It is recommended for use with new fluorescent luminaires featuring ultra-high output lamps and clusters of mercury and incandescent fixtures.

TRIPLEX Hangers permit one unskilled man to relamp and clean a luminaire without climbing or electrical hazards . . . extra manpower . . . space-consuming scaffolds . . . costly auxiliary equipment.

Featuring a new multiple-fall pulley system with a 3-to-1 mechanical advantage, the TRIPLEX Hanger is fabricated from durable corrosion-resistant components to assure years of dependable service and trouble-free performance.



For specification details, write today for Bulletin TR-57.



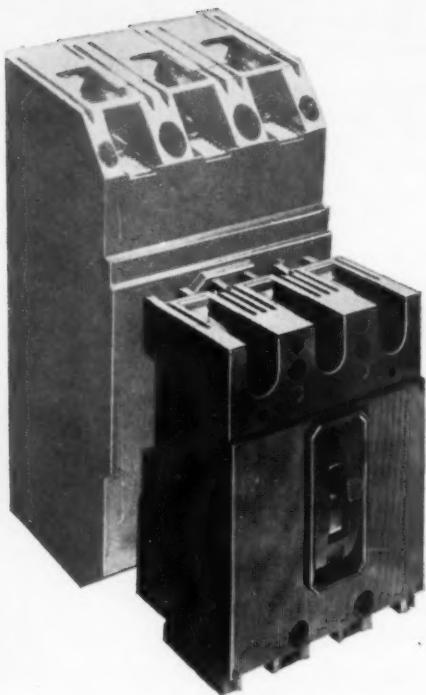
THE THOMPSON ELECTRIC CO.

P. O. Box 873-D

Cleveland 22, Ohio

NEW!

I-T-E ANNOUNCES
NEW 100 amp 480 V
"EH" FRAME
CIRCUIT BREAKER



Reduces mounting space requirement by 40%



Recognizing industry requirements for an intermediate, compact 100 amp frame 480 v breaker, I-T-E engineers have designed a new "EH" frame molded case circuit breaker which requires 40% less mounting space than breakers previously employed to meet the rating capacity.

The new "EH" frame breaker is ideal where intermediate voltage and interrupting ratings must be handled, and space is at a premium. Specify the I-T-E "EH" frame and benefit from the compact design advantages which this new circuit breaker provides.

Contact your local I-T-E sales office or write I-T-E Circuit Breaker Company.



SMALL AIR CIRCUIT BREAKER DIVISION

I-T-E CIRCUIT BREAKER COMPANY
19TH AND HAMILTON STREETS, PHILADELPHIA 30, PENNSYLVANIA

Reader's Quiz

QUESTIONS from readers on problems of industrial equipment, installation, maintenance and repairs. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published we pay \$5.00.

Transformer Connections

QUESTION B33—I have heard it said that the wye-wye 3-phase transformer connection with three single phase transformers and a grounded neutral is unpopular. Can someone explain?—R.E.B.

ANSWER TO B33—The culprit responsible for the unpopularity of this connection is the third harmonic current (180 cps) that flows in any power line to which magnetic devices such as transformers are connected. The magnitude of these currents is determined by the degree to which the iron in the connected magnetic device saturates; the voltage which they will build up is proportional to the circuit impedance to the third harmonic current. These currents are all of one phase, so they should have a low impedance path such as a ground return, or a delta winding in which to circulate.

In the early days, some sad experience was had with Y-Y banks that were operated with neutrals ungrounded. Lack of a path for third harmonic currents built up some high voltages, which varied widely with load. A certain amount of suspicion against Y-Y banks generally remains.

An advantage of providing a delta winding instead of merely a ground return, is that the third harmonic current will circulate in the delta, and the third harmonic voltage is then suppressed. With a ground return only, the third harmonic voltage developed across the load will be transmitted through the transformer, and onto the line.

In most cases, the Y-Y bank with grounded neutral may be used without difficulty if other banks with a low impedance path, such as delta or zig-zag windings, three phase core-type transformers, etc., are also on the line. Normally, a utility's incoming line has sufficient such paths elsewhere on the line that no troubles will be had.—E.J.P.

ANSWER TO B33—You are correct in your statement that a wye-wye system is uncommon. The reason for this is basically one in relation to harmonic components.

It is commonly known that the transformer exciting current has

substantially large third-harmonic components, a smaller fifth, and a still smaller seventh harmonic, and so on. The delta-wye connection removes the tendency for the production of this triple-frequency voltage, since any attempt to establish such a voltage simply circulates currents in the delta winding, thus keeping it out of the supply lines.

On the other hand, the wye-wye connection of transformers offers no such path for the triple frequency currents to flow in either the load or voltage source and, consequently, the line-to-neutral voltage has a large triple frequency component.—I.G.B.

How to Dry Flooded Motors

QUESTION C33—We have in our plant two 100-hp sump-pump motors, rated at 480 volts, 3-phase, 60 cps that are located in a pit which becomes flooded with river water. Is there any method of reconditioning flooded equipment in place? What is the minimum insulation resistance at which the motor may be considered ready for service?—J.M.

ANSWER TO C33—Drying out electrical equipment can be satisfactorily done by the application of heat sufficient to vaporize the water and thus dry out the coils.

In JM's case, heated air should be blown through the motor to accomplish this. Air blown over an electric heater by a fan or exhaustor, and directed at the motor, would be suitable.

In addition the motor windings should be connected to a source of variable low voltage and current passed through them to create heat within the windings to speed up the drying process.

Drying out will be sufficient when the insulation resistance is above 1 megohm per 1000 volts.

The motor in question should also be inspected before being put back in operation to make sure that dirt or debris has not collected on the windings to cause hot spots and result in eventual insulation breakdown. The bearings should also be flushed and repacked with fresh grease.

If JM's motor is subject to frequent wettings, it might be wise to coat the windings with some protective insulating varnish or an air dry silicone coating to prevent excessive water absorption during submersion and hence lessen the drying time.—R.E.B.

ANSWER TO C33—Electrical equipment that has been submerged in flood water will probably be filled with mud and foreign matter and require cleaning in addition to drying. If possible, the unit should be disassembled for best results. However, if care is exercised, the cleaning can probably be accomplished while the equipment is installed by wiping with clean rags, washing down with water at a pressure below 25 lbs per sq in., or if necessary to remove grease and oil, by using a suitable solvent.

Drying may be accomplished by applying external heat, internal heat or a combination of the two. One of the most satisfactory methods of applying external heat is to place electrical unit heaters under the end windings. Another recommended method of drying is with forced hot air. Internal heat is developed by subjecting the coil windings to a low voltage that will not cause damage to the windings. Regardless of the method utilized, care must be exercised to prevent overheating of the windings.

The AIEE recommended minimum safe insulation resistance for electrical equipment at a temperature of 75 degrees C is given by the formulas:

Insulation resistance of armature windings in megohms

$$= \frac{\text{rated voltage}}{\text{rated kva} + 1000}$$

Insulation resistance of field windings in megohms = 1 megohm plus.

These formulas are intended as guides only and not as a definite requirement or rule and must be used with caution. In general it may be stated that the resistance should be one megohm for each 1000 volts operating voltage, but in no case less than one megohm, regardless of voltage.

Further, information may be obtained from Section Seven of Knowlton's "Standard Handbook for Elec-

The Inquiring **HOUSEPOWER** reporter asks:

"How Has The **HOUSEPOWER** Program Affected Your Business?"

"Actually, we're doing more business than ever . . . and the bulk of it can be traced to the wiring modernization of older homes," is the quick response from **R. D. Beasley**, of Beasley Electric Service, 8183 Center St., La Mesa, California. "We're not only



BEASLEY

selling more rewiring jobs, we're selling *better* jobs. There's no doubt about it. It's a direct result of the HOUSEPOWER program. I find that many of our prospects are already 90% sold on full HOUSEPOWER by the time we first see them."

Rewiring Business Booming

The above is only one of many statements this reporter receives daily from electrical contractors all over the country. The consensus is a definite upsurge in rewiring business—and the contractors who are reaping the greatest benefits are those who are putting the HOUSEPOWER program to work. With a market of 20 million homes that need wir-

ing modernization, contractors are sure to profit. Here's what **W. M. Forsythe**, of Forsythe Electric Company, 445 Shenango Road, Beaver Falls, Pennsylvania, has to say:

"I've never had so many customer inquiries about adequate wiring in all the years I've been in the business. The HOUSEPOWER program is doing a terrific job, in my opinion. My customers — particularly the ladies — are actually *asking* for complete rewiring jobs. They've read about HOUSEPOWER in the ads, heard about it on radio and television . . . and they've come to realize the need for adequate wiring. This makes it much easier for me to make the sale of rewiring."



FORSYTHE

"Our company," asserts **Eugene Kasal**, of S. P. Electric Company, Inc., 2850 North Oakland Ave., Milwaukee, Wisconsin, "is really sold on HOUSEPOWER and its potential for building future bus-

iness. The HOUSEPOWER program has given our men a more polished approach to selling wiring modernization. Helps them sell-up. And the visual (given to all contractors who attend the HOUSEPOWER Forum) has been a wonderful aid to selling



KASAL

in the home. When you're inside someone's home, you know, there are usually many interruptions to your sales message. The HOUSEPOWER visual aid keeps the homeowner's mind on the subject and shows her the need for full HOUSEPOWER simply and effectively."

And how about you? Are you using all the HOUSEPOWER selling tools at your command? Although publicity has been widespread, you may not be aware of the complete scope of the program. Here is a recap of what has been done and what is being planned to help you sell more wiring installations, outlets, switches, and equipment in your town.

ADVERTISEMENT



\$100,000 Cartoon Caption Contest To Pull Leads By the Thousands

To bring you more leads for wiring jobs, the \$100,000 HOUSEPOWER Cartoon Caption Contest will start in mass magazines during Electrical Week (February 9-16). This national advertising effort will be extensively backed, both locally and nationally, by your industry allies. The contest uses a professionally tested technique for getting qualified wiring sales leads, which can be passed on to you. These leads can be your key to more business—more profit—in 1958!



National Wiring Bureau
a sponsor of

HOUSEPOWER
TRADE MARK

Nationally, the \$100,000 HOUSEPOWER Cartoon Caption Contest advertising will appear in *Better Homes & Gardens*, *The Saturday Evening Post* and *Sunset* — reaching a combined audience of over 10,000,000. (Note: The contest is fun. You may enter if you like.)



Almost 1,000,000 HOUSEPOWER Rating Sheets Distributed

The HOUSEPOWER Rating Sheet was devised to make your job easier by giving the homeowner a quick picture of his HOUSEPOWER needs. The Rating Sheet is being promoted in all forms of local and national advertising. If you are not using it, you owe it to yourself to try this simple sales tool which so many contractors are finding quick and profitable.

Selling HOUSEPOWER On National TV Shows

National television audiences will hear about the advantages

of full HOUSEPOWER on the *General Electric Theatre* and *Studio One*. The industry wishes to thank General Electric and Westinghouse for their continued support of the HOUSEPOWER program.

This Space Reserved for Your Comments and Ideas Regarding the Housepower Program

Contractors Enthusiastic

Contractors interviewed to date have been enthusiastic in their approval of the HOUSEPOWER program. Many are anxious to share their success stories and methods of adaptation of the national effort to build profit in their own business. That's why we pass this information along to you and your allies.

Free Booklet Shows Ways To Build Business

Build your business with HOUSEPOWER. Send today for the free booklet which shows you how to make '58 your biggest wiring year. Use convenient coupon below.

National Wiring Bureau
155 East 44th Street
New York 17, New York

Yes, I want to build my business with HOUSEPOWER. Please send me booklet on how I can make '58 my biggest wiring year.

NAME _____

STREET _____

CITY _____ STATE _____



EC&M-1



9 out of 10 save by using **Ramset® Products!**

RAMSET® powder-actuated tools and **SHURE-SET®** hammer-in tools cut fastening time and helped speed completion of this 23-story Cleveland Office building. "Saved from 2 to 15 minutes per fastening, depending on the particular job!", according to general superintendent.



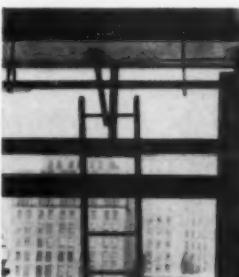
Harrington Electric Co.—electrical contractors—Installed floor conduits, ceiling lights, etc., using both SHURE-SET and RAMSET.



Feldman Bros. Co.—Steamfitters—Used SHURE-SET to anchor radiator chain supports.



Kornor Sheet Metal Co.—sheet metal work—Installed air-conditioning ducts with straps anchored by SHURE-SET.



Builders Structural Steel Corp.—steelwork and valances—Used RAMSET to prevent thrusted trusses from swaying.



Johnson Service Co.—temperature controls—Twin temperature pipes anchored with SHURE-SET.



Gillen Acoustical Co.—acoustical ceilings—Kickers and hangers installed with RAMSET.



Home & Industrial Heating Co.—air-conditioning—Used RAMSET fasteners to hang heavy external louvers.



E. J. Brandt Co., Inc.—perimeter guards—Installed kicker plates and radiator guards with RAMSET.



Geo. A. Fuller Co.—general contractors—Door bucks anchored with SHURE-SET threaded studs and extension couplings.

trical Engineers", published by McGraw-Hill, from a Westinghouse Electric Corp. book called, "Maintenance Hints", or from the manufacturer of the apparatus in question.—J.W.W.

Measuring Footcandles Of Light

QUESTION D33—Could a photographer's exposure meter be used as a light meter to measure footcandles of illumination of lighting installations? A regular meter is evidently difficult to purchase and expensive. Is the usual scale of an exposure meter marked off in footcandles or can footcandles be quickly determined by applying a multiplying factor? Will the scale of the exposure meter take care of all lighting installations?—E.B.

ANSWER TO D33—A photographer's exposure meter can very definitely be used as a light meter to measure footcandles of illumination. However, the photographic lightmeter is frequently not as accurate nor as stable as a commercial light meter. This cannot be made as a general rule as there are some good exposure meters on the market which will remain stable. However, under those circumstances, the cost of the exposure meter is the same as the price of the light meter.

There are a number of good light meters available at reasonable prices, something in the neighborhood of \$50.00 to \$75.00. If the questioner does not know where to get one, would he please write to me and I shall advise him.

The exposure meter generally speaking is marked off in stops rather than in footcandles; furthermore, the exposure meter is in many instances a logarithmic affair to cover an extremely wide range of illumination. However, the light meter is a linear calibration.—H.H.S.

ANSWER TO D33—Yes, a photographer's exposure meter could be used to measure footcandles. In fact, some exposure meters are calibrated in footcandles. However, you should understand that a footcandle meter measures incident light, or light which falls on a surface from all directions and the typical amateur photographer's meter measures only the light within an approximate 30° cone. In other words, the exposure meter measures the light coming from one direction.

Shure-Set
Trademark

HAMMER-IN FASTENING TOOLS
PATENTS PENDING
BY THE MAKERS OF **Ramset®** PRODUCTS

Ramset Fastening System

WINCHESTER-WESTERN DIVISION
OLIN MATTHESON CHEMICAL CORPORATION

12105-A BEREA ROAD

CLEVELAND 11, OHIO

One make of exposure meter, calibrated in footcandles, has removable hood over the light sensitive cell to roughly the same area seen by the camera lens. By removing this hood so that light coming from all directions may hit the cell, the meter will measure footcandles.

Many exposure meters with scales not marked in footcandles may be used to measure footcandles if the multiplying factor is known. A piece of white paper with a known reflectance factor can be laid on the surface where measurement is to be made. A reading may then be taken of the brightness of the paper. Care should be exercised not to shadow the paper or intercept light from the areas beyond the edges of the paper. The reading obtained should be divided by the reflectance factor of the paper and multiplied by the "multiplying" factor of the meter.

The scale of most exposure meters goes quite a bit higher than the 10 to 100 footcandle range usually in measuring general area lighting and would, therefore, have poor accuracy in the range. In general, a photographer's exposure meter is a poor tool for measurement of footcandles.—J.F.F.

ANSWER TO D33—I have found the General Electric IW series to be suited to combination application as a photographic light meter and for measuring room illumination. The scale was in direct-reading footcandles and the several components adapted for various intensities of incident and reflected light. I have not seen this instrument on the local shelves recently.

One leading instrument is designed to measure incident light, the light falling on the subject, but it is not directional. It integrates the light which strikes a hemisphere. The usual photographic light meter operates on reflected light, the light which is reflected from the subject toward the camera. Such instruments can be converted to illumination measurements by taking a reading against a standard surface, a card of known reflectance, and applying a conversion factor. The instruction book of a leading photographic meter gives such a factor, but fails to specify a standard surface.

Unless the instrument is designed for such a dual use, resulting accuracy may leave something to be desired. A standard surface would have to be carried, and it would tend to change in time. The scales may be compressed at the

Now PROTECT IMPORTANT WIRING CIRCUITS
PERMANENTLY WITH LIQUATITE

... Eliminate COSTLY DOWNTIME!

Positive uninterrupted electric service is assured with Electri-Flex LIQUATITE . . . the liquid tight flexible wiring conduit.



ideal for easy, quick installation — even for "hard-to-get-at" locations.

LIQUATITE eliminates costly shorts, burnouts, slow-ups, re-wiring and costly downtime caused by oil, chemicals, water, corrosive fumes and vapors, grease, dirt, salt air and spray, coolants, abrasives, weather and other injurious elements.

In standard Machine Tool Gray or Black . . . in conduit sizes from $\frac{3}{8}$ " to 4" . . . in standard coil footage (sizes and foot-marked on jacket) . . . in easy to handle special payout cartons or non-returnable reels.

ELECTRI-FLEX COMPANY ROSELLE, ILLINOIS



Today...

Mail coupon for complete literature, prices and a generous sample of LIQUATITE flexible wiring conduit. No obligation of course.

Electri-Flex Company
Roselle, Illinois

Please send, without obligation, your literature, prices and sample of Electric-Flex LIQUATITE flexible wiring conduit.

Company _____

Your Name _____

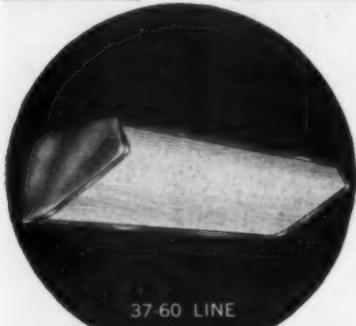
Address _____

City _____ Zone _____ State _____

ECM1

new

lighting
design
by
mc Philben



mcPhilben's new 37-60 line designed by E. Allan Rothman provides the most efficient lighting of fitting rooms, mirrors, stair landings, telephone bookstands... wherever localized illumination is desirable.

Available in both fluorescent and incandescent models offering these exclusive features: continuously hinged doors for easy relamping... all metal construction... baked on grey enamel finish... removable reflectors for easy access to electrical components.

37-60 Two 60 watt lamps
37-65 Two 15 watt T-8 fluorescent lamps

Contact your mcPhilben representative for full details. See our insert in Sweet's file 32a or write for data sheet C/27

mc

mc Philben

LIGHTING COMPANY

1320 WILLOUGHBY AVENUE, BROOKLYN 37, NEW YORK

point of usual illumination levels so that a close reading would be questionable. While the scales may look uniform, it may be that the actual readings after conversion are far from uniform or that the values between scale divisions are too great to read accurately. I would not attempt to convert an instrument unless a reliable dealer gave me ample opportunity for trial.—L.E.B.

Can You Answer These QUESTIONS

QUESTION Q33—We have some 200 ft and 300 ft conduit run with 4/0 feeders lying therein which we wish to pull out and replace with larger capacity cable.

First attempts to pull out the old 4/0 cables have been unsuccessful since they seem to be frozen or locked in the conduits. Can someone with similar experience suggest a practical method to remove these cables?—R.E.B.

QUESTION R33—I would like to know if one could run two motors on the same job. For example, two 30 hp 1200 rpm, 3-phase, the same make and speed, one mounted over the other with a matched set of belts the same length for both motors. What horsepower would you have and would both motors share the load?—C.H.

QUESTION S33—Recently the brushes on one of our large dc machines developed chattering and noisy operation, and to date we have been unable to eliminate this condition. Can someone suggest the possible cause and remedies?—R.E.B.

QUESTION T33—How is a 10-hp, 3-phase, 440-volt induction motor tested with an ammeter to determine if it is overloaded?—G.J.P.

QUESTION U33—In insulation resistance measurements, what is meant by "the dielectric absorption of the insulation"? With motor-operated megometers, what is indicated if the reading continues to increase (higher megohms) for about 15 minutes before a steady state value is reached?—J.M.

PLEASE SEND IN
YOUR ANSWER BY FEBRUARY 15

Latrobe Electrical Products

There is nothing complex or intricate about "Latrobe" Floor Boxes and Wiring specialities.

Their design and mechanism is kept simple and sure.

That is why "Latrobe" products are so quick to install and so trouble-free in operation.

Non-Adjustable Watertight Floor Box

Unique, practical design cuts installation time; makes safer job and leaves more wire space inside box. Cover Plate is 3½" diameter.



Adjustable Floor Box

Designed for telephone outlet or where permanent connections are made, or as a junction box. All adjustable boxes are fire proof.



"Latrobe" Pipe or Conduit Clamp

This clamp is made with double safety bite of case hardened tool steel. Two models—Right Angle and the Parallel support. Each model comes in 10 sizes to handle pipe or conduit ½" thru 4".



Insulator Supports

Fasten porcelain or glass insulators to steel framework without punching holes. 3 sizes—1", 1½", 2" and 2½".



Latrobe Products

Non-Adjustable Floor Boxes

Adjustable Floor Boxes

Gang Boxes . . . Cover Plates

Junction Boxes . . . Nozzles

Pipe or Conduit Hangers

Insulator Supports

Cable Supports . . . Fish Wire

Staple and Cable Clips

Write for new catalog

Sales Representatives in all principal cities.

Fullman
Manufacturing Co.
1209-1215 JEFFERSON STREET
LATROBE, PA.

SILENCE IS GOLDEN



a golden opportunity for you with...

NEW CIRCLE F NO-KLIK® SWITCH

Everyone is talking about the new innovation in light switches . . . the CIRCLE F Quiet one.

The CIRCLE F NO-KLIK® Quiet Switch is a superior mechanical switch (not a mercury switch) made of heavy sturdy Bakelite with special non-welding silver alloy contacts — operates on A.C. current *in any position* for both incandescent and fluorescent lamp loads. No other switch offers you a more golden opportunity to cash in on the quiet switch market than the CIRCLE F NO-KLIK® Quiet Switch. Contact your local Circle F representative or write Circle F direct for more information.

*3401 and 3403 — 15 Amps — 120 Volts A-C [L] — 15 Amps — 120-277 Volts A-C

There are Circle F NO-KLIK® Quiet Switches for Industrial Use, too. Identified by Red Moulded Covers on Switches.

**3421 and 3423 — 20 Amps — 120 Volts A-C [L] — 20 Amps — 120-277 Volts A-C only



3401*
15 AMPS — 120-277 Volts A.C.



3403*
15 AMPS — 120-277 Volts A.C.



3421**
20 AMPS — 120-277 Volts A.C.



3423**
20 AMPS — 120-277 Volts A.C.



Circle F Mfg. Co.

TRENTON 4, NEW JERSEY

For your wire requirements: Eastern Insulated Wire Corp. — A Subsidiary
Box 591, Trenton, N.J.



IN CANADA:
VERD-A-RAY
ELECTRIC
PRODUCTS LTD.
MONTREAL 9.

Questions on the Code

Answered by:

B. A. McDONALD, New York Board of Fire Underwriters, Rochester, N. Y.

GLENN BOWELL, Electrical Engineer, Fire Underwriters Inspection Bureau, Minneapolis, Minn.

B. Z. SEGALL, Consulting Electrical Engineer, New Orleans, La.

Sealing Requirements— Service Stations

Q. As electrical inspector for a municipally owned utility, many problems arise, most of which work themselves out. We have for some time had the same problem coming up from time to time, namely, the location of seal-offs in gasoline stations. We have been requiring seal-offs in every conduit going from a non-hazardous area to or through a Class 1, Division 2 area (18 in. above grade level). All of these conduits do not necessarily lead to a dispensing pump island. We would like your interpretation of the code as to Article 500, Section 5015 B.—C.J.M.

A. As provided by Section 5120-b-2 a Class 1, Division 2 hazardous area exists within 20 ft horizontally from any gasoline dispensing island to a distance of 18 in. above the driveway. Any wiring equipment installed below the surface of such an area is considered to be in a Class 1, Division 1 location which shall extend at least to the point of emergence. The underscored words are new in the 1956 Code, and were inserted to clarify the intent of the 1953 Code. See Fig. No. 1.

A literal reading of the 1953 code was interpreted by many to require underground seals to be installed at the points marked with an asterisk, since the conduits entered or left the hazardous area at such points. Since such procedure is impracticable and would interfere with the replacement of conductors in underground conduits, the code was revised so that the hazardous area was extended to at least the point of emergence of the conduit. For example, the underground conduits A, B, C and D, as shown by Fig. No. 1, are considered to be in a Class 1, Division 1 location, not only under the shaded Class 1, Division 2 area, but also to the point where they emerge. Conduits A, B and C emerge in the service station as shown by Fig. No. 2 and seals are

required at this point as shown. Conduit D emerges at the flood-light and a seal is required at this point. Conduit E, which runs from one floodlight to another is not in a hazardous location and no seal is required in this run.

The provisions of Section 5120f-1 require a seal in each conduit run entering or leaving a dispensing pump or other enclosure on a dispensing island. Since this code provision only concerns the conduits running to the island, it is quite

evident that they do not apply to conduit run A. When a conduit does not enter an island, the general provisions for sealing, as covered by Section 5015, apply. Conduit A leaves the service station, as shown by Fig. No. 2, and runs underground to the point marked by an asterisk as shown on Fig. No. 1. At this point it enters a Class 1, Division 1 location and this area extends to the point of emergence at the floodlight and in the service station. As a result,

Fig. No. 1

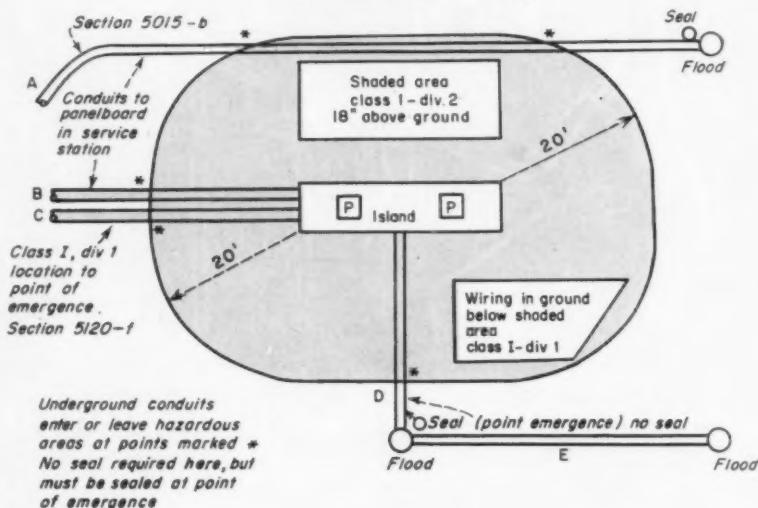
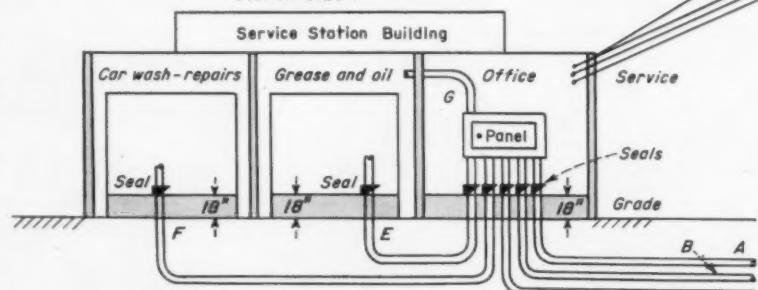


Fig. No. 2
Sealing provisions
Section 5015-A and B
Section 5120 F



*Shaded area, Class I, Div. 2, hazardous area, 18" above floor.
Conduits B and C to island.
Conduit A to floodlight
Conduits A, B and C, Class I, Div. I, location to seals shown above.*



FOOT SWITCHES that can take it!

- **BUILT FOR THE TOUGHEST SERVICE** inside and out—from the maintenance free, snap action, double break, silver alloy contacts to the rugged, die cast aluminum housing—the redesigned Allen-Bradley Bulletin 805 foot switch is a challenge to tough jobs! The on-center treadle operation eliminates the need for bolting down the switch—the extended base keeps it from tipping.

- **VERSATILE OPERATION**—The contact trip point is easily adjustable. When equipped with two contact blocks, this foot switch can be set for simultaneous or two-stage operation. The Bulletin 805 foot switch can also be furnished with a latch to provide maintained contact operation. In addition, this latch, when desired, can be made inoperative, and may be quickly changed from one to the other side of the foot switch.

The Bulletin 805 housings are available for NEMA Type 4 watertight and oiltight applications, or NEMA Type 7 explosion-proof service.

Try the Allen-Bradley Bulletin 805 foot switch—you'll find it "tops" in its field. Send for full information.

**Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.**



Bulletin 805 Style A
switch with latch.



Bulletin 805 Style A
switch with latch and top
guard to prevent
accidental operation.



Bulletin 805 Style A
switch with latch and
guard covering both
top and sides.

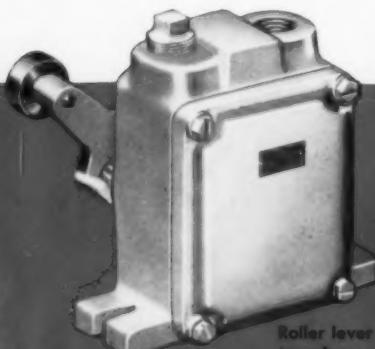


Husky

BULLETIN 801

LIMIT SWITCHES

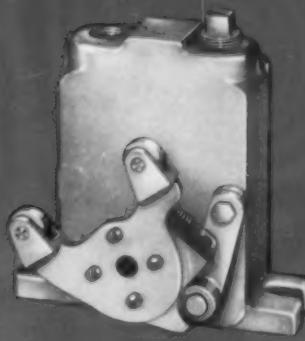
IN A THOUSAND AND ONE TYPES



Roller lever
type in
watertight enclosure.



Cutaway view of
Bulletin 801 heavy duty
limit switch. Note
the sturdy construction.



Roller fork
type in
watertight enclosure.



Center roller,
standard duty
switch.



Switch with two
independently
adjustable rollers.



Push type,
heavy duty
switch.



Fork type,
snap action
switch.



From among the hundreds of Allen-Bradley Bulletin 801 general purpose limit switches, you're sure to find your exact requirements. There are 21 different contact arrangements available, including types with single or multiple poles, N.O. and N.C. contacts, spring return or maintained contacts, with either a slow or snap action mechanism. It will pay you to know this *quality* line of limit switches. If you do not already know this quality line, let's get acquainted. Write for the complete story.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

seals are required at the point of emergence and not underground at the points marked with an asterisk.

Fig. No. 2 also illustrates a typical service station building which is sectionalized to cut-off the various types of services. Usually we have an office, a lubricitorium and a third section devoted to repairs, car wash etc. The two sections involved with lubrication, repairs, maintenance, installation of mufflers etc., definitely come within the scope of a commercial garage as covered by Section 5105a. As a result a Class 1, Division 2 hazardous location exists for a distance of 18 in. above the bottom of the outside doors. The statute of the office section is questionable, depending upon several variables. If the office section of the building is within 20 ft of the island, or the tank fill or tank vent pipes, it definitely is in a Class 1, Division 2 location. If there is an unprotected opening in the division wall within 18 in. of the floor, such as a door, it undoubtedly would be considered to be a Class 1, Division 2 location. If none of these conditions prevail, it might be classed as a non-hazardous area. Usually there is such a door and it usually is opened and I believe we are correct, under such conditions, in designating the office a Class 1, Division 2 location. On this assumption we have shown by Fig. No. 2, two conduit runs designated E and F, which originate in a non-hazardous area at the panelboard. They enter a hazardous area 18 in. above the office floor. A seal is required at this point as shown. They continue underground, in a non-hazardous area, to the other two sections of the building which are hazardous to a distance of 18 in. above the floor. Seals must be installed in both E and F conduit runs as shown. No seals are required in conduit run G provided it does not enter the Class 1, Division 2 location shown on the illustration.—B.A.McD.

Precast Cellular Concrete Raceways

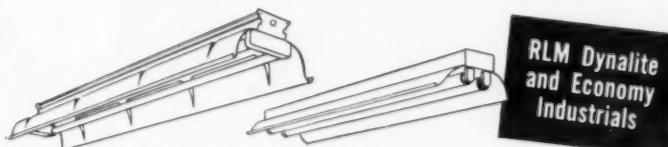
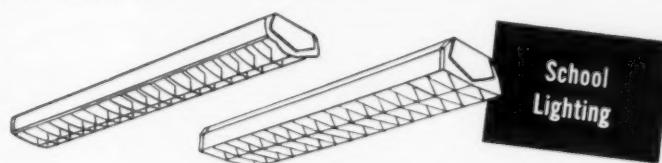
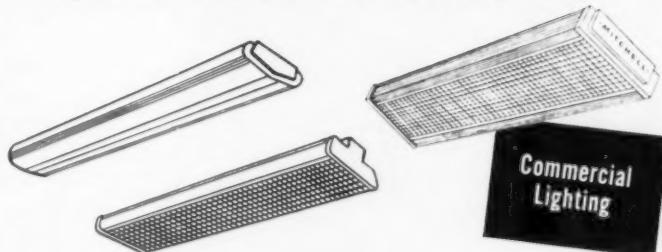
Q. Would I be violating code requirements if I were to run electrical conductors for lighting (in service station) through precast cellular concrete raceways?—F.F.

A. Wiring in service stations is covered in Sections 5120e

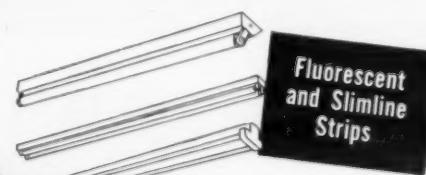
Mitchell

The Most
Dependable
Name in Lighting!

A Complete Line for Every Specification...Every Job!



Mitchell Lighting Company gives you the finest design and engineering in Fluorescent Lighting. Established more than 25 years ago Mitchell Lighting experience in design, engineering and manufacturing is your guarantee of quality lighting equipment made by a dependable organization.



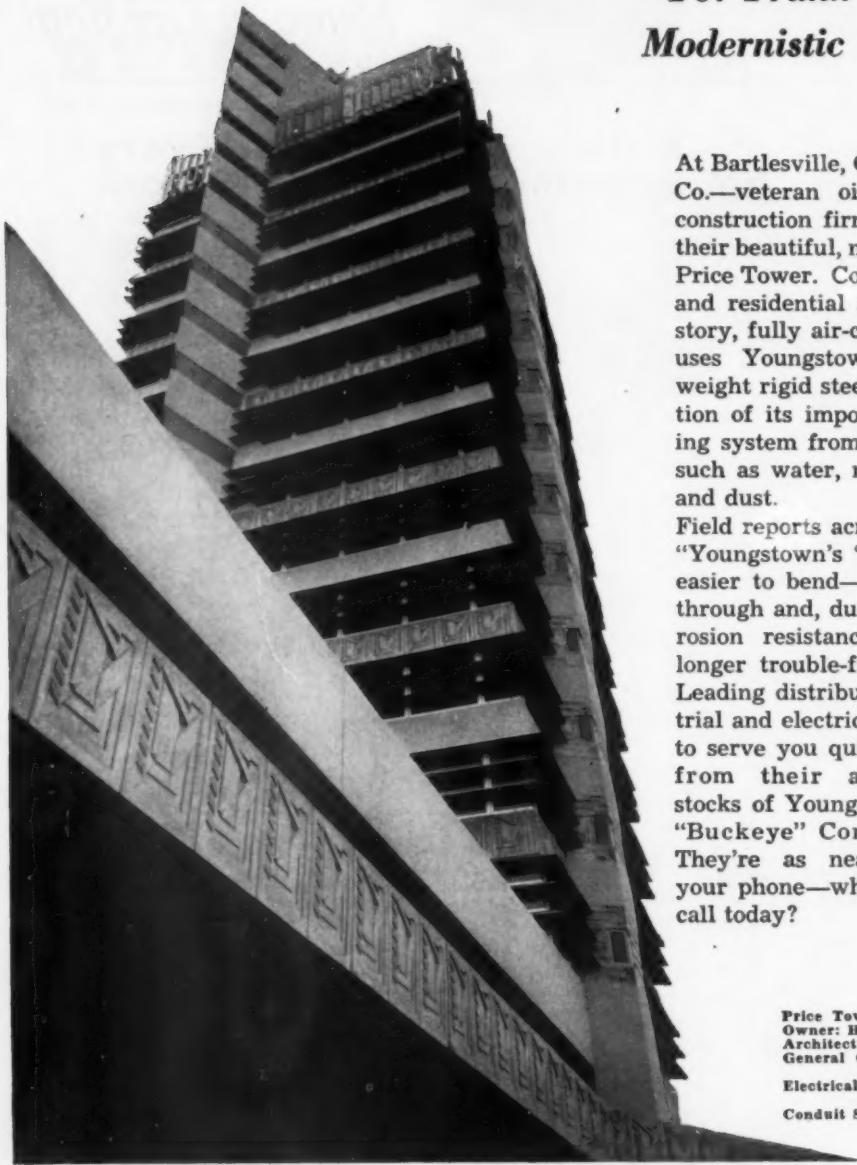
Mitchell

MITCHELL LIGHTING COMPANY

2263 W. St. Paul Avenue • Chicago 47, Illinois • U.S.A.

YOUNGSTOWN "BUCKEYE" CONDUIT

*... Provides Lifetime Wiring Protection
For Frank Lloyd Wright's
Modernistic Price Tower*



At Bartlesville, Okla., the H. C. Price Co.—veteran oil and gas pipeline construction firm—recently opened their beautiful, new cantilever-design Price Tower. Containing both offices and residential apartments, this 19-story, fully air-conditioned structure uses Youngstown "Buckeye" full-weight rigid steel conduit for protection of its important electrical wiring system from damaging elements such as water, moisture, vapor, dirt and dust.

Field reports across-the-nation state: "Youngstown's 'Buckeye' Conduit is easier to bend—easier to fish wires through and, due to its superior corrosion resistance, affords a much longer trouble-free service life." Leading distributors in every industrial and electrical market are ready to serve you quickly and efficiently from their ample stocks of Youngstown "Buckeye" Conduit. They're as near as your phone—why not call today?



Price Tower, Bartlesville, Okla.
Owner: H. C. Price Co.
Architect: Frank Lloyd Wright
General Contractor: Culwell Construction Co.,
Oklahoma City, Okla.
Electrical Contractor: Industrial Electric Co.,
Oklahoma City, Okla.
Conduit Supplier: Westinghouse Electric Supply
Co., Oklahoma City, Okla.



Standard-threaded rigid steel conduit is the only wiring system approved today by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities

and Section 5120f. Section 5120c definitely would require the use of rigid metal conduit in all areas classified as Class 1, Division I Hazardous areas, as defined in 5120b, so this concrete raceway would not be permitted.

Section 5120c also refers to Class 1, Division II areas, also as defined in Section 5120b and in such areas both rigid metal conduit and EMT are permitted. If EMT is to be used then it must be "Threaded" in accordance with the requirements of Section 3487. Here again the use of the concrete raceway is not permitted.

In the areas which are not classified as hazardous in Section 5120b, we must consider two possibilities. The first of these is those areas which are not hazardous in themselves, but are above such hazardous area. For example, in Section 5120b2, the Class 1, Division 2 locations are defined to exist up to a height of 18 in. above a driveway or ground level. It is possible to have electrical equipment and wiring in an area directly above this 18-in. level. For example, an office area not satisfactorily cut off from an adjacent area having a fill pipe, or very close to a dispensing island may have its entire floor area for a height of 18 in. above the floor, classified as a Class 1, Division 2 location. The lighting and wiring, etc., in the ceiling above this area would come within the scope of this requirement.

Section 5120d refers to Section 5120e for the approved wiring method. Here in paragraph 1 we have a liberalization for the use of any wiring method using metallic raceways (See definitions—Raceways) or Type MI cable. This would in effect, permit the use of Cellular Metal floor raceways (under certain conditions), but not the concrete type.

The second possibility would be where no hazardous areas whatsoever are involved. Thus, referring again to our example of the office area above, suppose now we do have a properly cut off area so that no section of this floor area is classified as hazardous. Now the wiring and the equipment in the entire area of the office would be classified as non-hazardous and under these conditions we could install the concrete raceways in accordance with the requirements of Article 358. Specifically, section 3582 sets forth the conditions under which wiring systems may be installed in precast cellular concrete floor raceways.—B.Z.S.

fast-action Fixture Hangers

by **IDEAL** SIMPLET

help you hang fixtures in seconds

**NEW "LOW COST" model
K-120 Series**

Makes fixture hanging a snap. Mounts directly on 3½" or 4" outlet boxes. Grounds to conduit. Slots and off-set hooks provide adjustment up to 38°. Supplied with variety of receptacles from 115 V. to 600 V. Complete with two 5' chains, hooks and cord clips.



38° total adjustment
7 receptacle types

Both for Any Standard Fluorescent Fixtures

**"FRICTION-SET" model
K-100 Series**

A twist of the wrist aligns fixture — instantly . . . after hanger has been attached to any 3½" or 4" outlet box. Base and receptacle stationary—arms revolve 355°. Exclusive friction ring holds fixture firmly in selected position. Receptacles mounted at factory. Two 5' chains, hooks, cord clips supplied.



355° adjustment
3 receptacle types

Also . . . FLEXIBLE HANGERS FOR PENDANT FIXTURES

½" and ¾" sizes — all cadmium finish



ALA Series

ALC Series

ALL Series

ALT Series

Ball and cushion types; threaded; and no-thread for heavy and thin-wall conduit. Hold all fixture weights through 48 to 72.

FULL COVERS • DESPARD and T-SLOT COVERS • OTHER ACCESSORIES

For complete details and prices see your wholesaler . . . or send coupon



Pioneers in electrical specialties

IDEAL-SIMPLET FITTINGS, Inc.

A Subsidiary of Ideal Industries, Inc.

1041-A Park Avenue

Sycamore, Illinois

IDEAL-SIMPLET FITTINGS, Inc.
1041-A Park Avenue
Sycamore, Illinois

Send Fixture Hanger Literature

Name _____

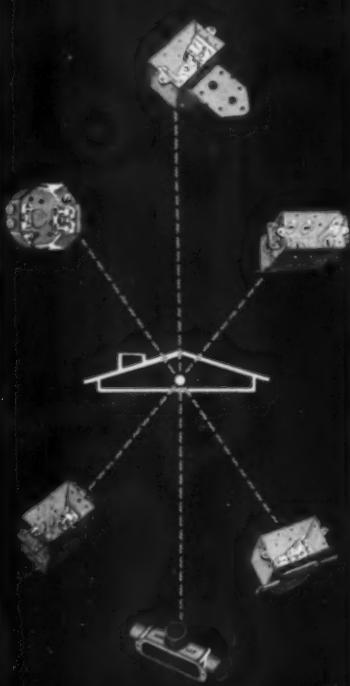
Company _____

Address _____

City _____ Zone _____ State _____



Count On
ARROLET
Boxes
To Do A
Better Job
-All Around
The House!



When you have to consider quality, time and costs . . . your most profitable choice is Arrolet, for —

SWITCH BOXES
OUTLET BOXES
BOX COVERS
FITTINGS
& RELATED ITEMS

Quality Needed for Tomorrow
is in Arrolet Products...Today!

ARROLET
CORPORATION
Montgomery, Penna.

Sales Representatives & Warehouses Stocked: BALTIMORE, MD.
*CHICAGO, ILL. *CINCINNATI, OHIO *DALLAS, TEX.
*GREENSBORO, N.C. *KANSAS CITY, MO. *LOS ANGELES, CALIF. *NEW YORK, N.Y. *NEW YORK, N.Y.
*NEWTON CENTRE, MASS. *PHILADELPHIA, PA. *
ROCHESTER, N.Y. *TAMPA, FLA.

Protective Devices

Q. In a pressurized control room in a grain elevator where the motor control switches can be so located that the tap between these switches and the feeder is less than 10 ft in length, is it necessary to provide fuse protection for these taps if each ungrounded leg in the controller is equipped with a suitable heater as required by the nameplate rating of the motor it controls?—M.A.C.

A. As a general rule, motor-running protective devices are not suitable for opening short circuits and under Section 4330 of the Code you will find the following: "Thermal cutouts, thermal relays, and other devices for motor-running protection which are not capable of opening short-circuits, shall be protected by fuses or circuit-breakers with ratings or settings of not over four times the rating of the motor for which they are designed, unless approved for group installation, and marked to indicate the maximum size of fuse by which they must be protected."

Therefore, even though you provided a thermal cutout or relay in each of the ungrounded conductors supplying the motor in question, it would be necessary to provide some other type of overcurrent protective device capable of operating under short-circuit conditions. The only exception to this would be in the instance where the feeders themselves were protected with fuses or circuit breakers having a setting not more than four times the rating of any of the motors which supply them.—G.R.

Fixture Supports

Q. We have the electrical contract in a new schoolhouse and just started to hang the 8-ft tubular fixtures when a local inspector advised us that we would have to change our method of fixture support as he would be unable to OK the job as we started to use expansion bolts for the two end stems. The fixtures in question are provided with three stems and we bid the job expecting to use a fixture frog to attach the central stem and support the two end stems with toggle bolts extended through drilled holes in the plaster ceiling. The ceiling consists of $\frac{1}{2}$ -in. gypsum board attached with metal clips to furring channels with $\frac{1}{2}$ -in. of

RUGGED 3 PHASE A.C. GENERATORS

ADAPTABLE TO
ANY INDUSTRIAL ENGINE!

Emergency or Continuous Duty. Your specific requirements can be met with a Kato A. C. or D. C. Generator. Fit any engine by means of Kato's Flexible Couplings. All Standard frequencies—25, 50, 60 and 400 cycles; special frequencies to 1200 cycles. Also wide range of Motor Generator Sets; Converters, Frequency Changers, Motors.

SPECIAL ORDERS WELCOMED!



- OUTPUT—350 WATTS TO 500 KVA. 60 CPS.
- 400 CYCLE LINE TO 250 KVA.
- SINGLE BEARING, STANDARD TWO BEARING OR TWO BEARING CLOSE COUPLED.

WRITE FOR FOLDER!

Builders of Fine Electrical Machinery Since 1928
KATO Engineering Company
Phone 5031, 1442 First Ave., Mankato, Minnesota

BE PRECISE--
SPECIFY
PRECISION

LIQUID FILLED TRANSFORMERS

with the
EXCLUSIVE
5-YEAR
GUARANTEE

OIL or
ASKAREL
FILLED



Above-average overload capacities and a rugged structural steel construction guaranteed to give years of top service make PIC LIQUID FILLED TRANSFORMERS ideal for all power and lighting distribution systems—indoors or out. Reinforced insulation is used over the entire winding. Cork-prene gaskets are used throughout and the copper coils are vacuum impregnated thru several complete cycles. PIC transformers meet or exceed NEMA, ASA and AIEE specs.

Single and 3 Phase Up to 45,000 volts

Please write for TECHNICAL BULLETINS &
Catalogs

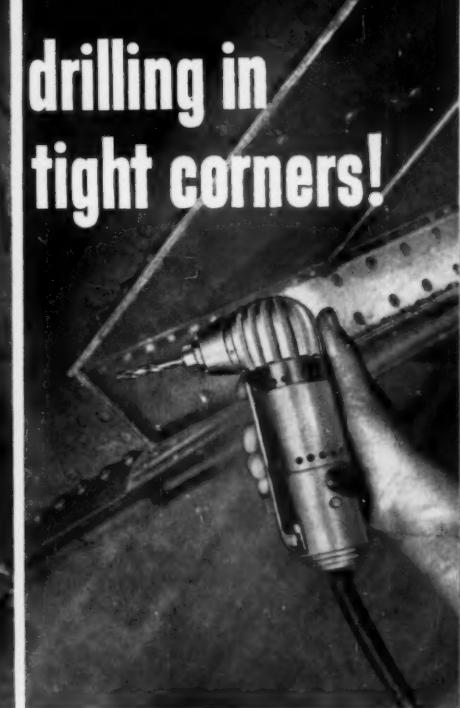
PIC PRECISION
TRANSFORMER CORP.
2218 W. Lake St., Chicago 17, Ill.



Heavy drilling



...light drilling...

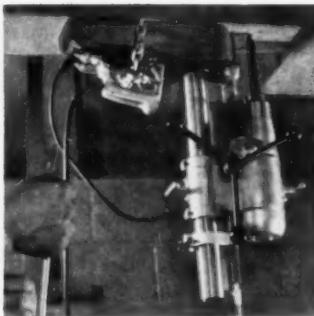


drilling in tight corners!

There's a Black & Decker Drill powered for every job!



LITTLE SHORTY's the drill you want for those hard-to-get-to, around-corner jobs. Gets in tight spots! Excellent for small unit assembly.



DRILLS UPSIDE DOWN! B&D Magnetic Drill Press sticks to the wall like a fly; operates manually or with exclusive remote control.

TREMENDOUS TORQUE for the tough jobs. $\frac{3}{4}$ " Heavy-Duty Drill is geared and powered to take on the hard ones. Compact to work in close quarters.

Most POWERFUL drill of its size available, the $\frac{3}{4}$ " Standard! A rugged tool with plenty of zip in reserve. Fully reversible; positive drive clutch.



71% of purchasing agents say
make mine Black & Decker!

A recent industrial publishing company survey reveals that when purchasing agents need electric tools most think first of Black & Decker! One reason why: 33 different drills each designed to give you the power you need plus easy handling and long, troublefree life!

If you have a drill problem—a small hole in trim to a large hole up among the structural steel—be sure to see Black & Decker. Better still, mail the coupon for a free demonstration of our drill line. THE BLACK & DECKER MFG. CO., Dept. 1201, Towson 4, Maryland. (In Canada: P. O. Box 278, Brockville, Ontario).



Leading Distributors Everywhere Sell



Black & Decker®

Quality Electric Tools . . . Power-built for top performance

→ MAIL COUPON FOR FREE DEMONSTRATION ←

THE BLACK & DECKER MFG. CO., Dept. 1201, Towson 4, Md.

Please arrange for a demonstration of the following drill(s)
 Please send me additional information.

Name..... Title.....

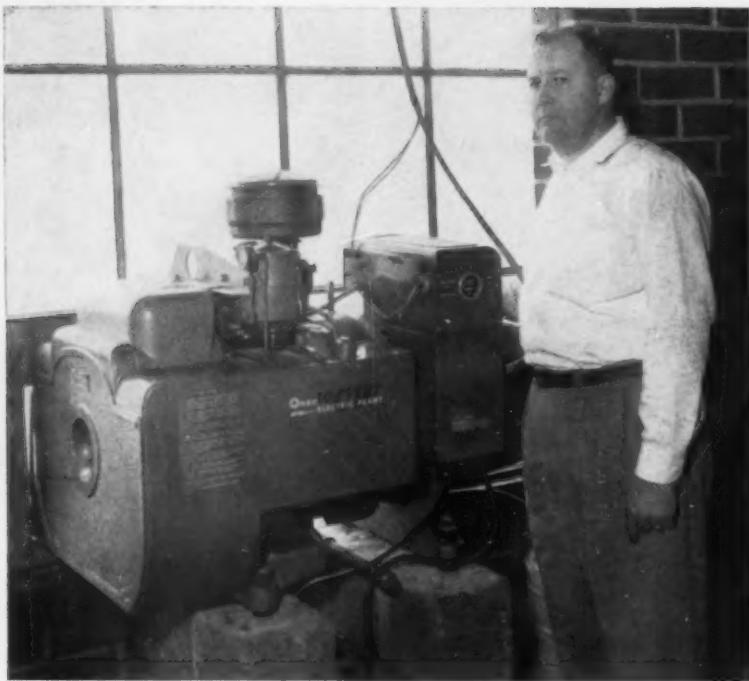
Company.....

Address.....

City..... Zone..... State.....



ELECTRIC PLANT NEWS



Standby plant paid for itself four times in four months

"Couldn't operate without this protection," says C. G. Young of the Hiawassee Hatchery

Sleet, lightning, wind and snow . . . each took their turn at knocking out the high-line serving the Hiawassee (Georgia) Hatchery. Power was off for periods ranging from 2 to 7 hours. Each time, the Onan CW Standby Plant started automatically and took over the power load . . . operating all essential equipment and preventing any loss whatsoever.

Standby protection at lower cost

Onan air-cooled plants like the CW model shown here, cost substantially less than water-cooled units of similar capacity. Onan's exclusive Vacu-Flo cooling system permits using these lower-cost, air-cooled units where previously it would have been necessary to use water-cooled plants or to install elaborate ventilation equipment. Vacu-Flo models range from 1,000 to 10,000 watts . . . water-cooled from 10,000 to 75,000.

Models for homes, farms, industry. Write for information on dealerships.

D. W. ONAN & SONS INC.

2794A Univ. Ave. S.E., Minneapolis 14, Minnesota • PHONE: FE 2-1155



acoustical plaster on the gypsum board. The inspector claims that toggle bolts are not acceptable for the support of the two end stems. Is he correct?—P.K.

A. Yes, the inspector is correct and if you will refer to Section 4132 of the Code, you will note the following: "Where there is an outlet box or a fitting which will provide adequate support, a fixture shall be attached thereto; otherwise a fixture shall be supported as required by section 3707. A fixture which weighs more than 50 lbs shall be supported independently of the outlet box."

Then if you will refer to Section 3707, paragraph a., you will note the following: "In concealed work, except as prescribed in paragraph b of this section, outlet boxes and fittings, unless securely held in place by concrete, masonry or other building material in which they are embedded, shall be secured to a stud, joist or similar fixed structural unit, or to a metal or wooden support which is secured to such a structural unit. Wooden supports shall not be less than $\frac{1}{2}$ in. in thickness. Lath of wood, metal or composition shall not be considered a structural unit."

Therefore, in order to support your fixtures as is required by the Code, the two end stems should be supported by a metal strap which extends from one furring channel to the next. The only exception to this rule would be in an existing building where a rewiring job was in progress and the wiring was fished in concealed spaces.—G.R.



Automatic operation . . . This Onan line transfer control starts the electric plant when power is interrupted and switches current to all essential hatchery equipment. Plant stops automatically when power is restored . . . protects hatching stock at all times.

Circuit Breaker Handle Ties

Q. I am concerned about the use of some things that might be classified as gadgets. Some good and some not so good, they are used to tie the handles of two single pole breakers together, and call it a 2-pole breaker. These are used on small breakers of 30-amp and less. Many are rather flimsy in keeping of the two breakers together thus allowing one to act ahead of the other. I wonder if after years of service it will actuate both breakers. Are these UL approved? Does the code approve their use? I would appreciate it if you would analyze outside the code and express your personal opinion.—L.E.M.

A. Section 2351-a of the Code recognizes the use of two or

three single pole switches or breakers, capable of individual operation, for use on multi-wire circuits provided they are equipped with "handle ties", handles within $1\frac{1}{2}$ in. proximity, a "master handle", or "other means" making it practical to disconnect all conductors of the service with no more than six operations of the hand.

Section 2353 says that the service disconnecting means shall simultaneously disconnect all ungrounded conductors. Simultaneously is defined "at the same time".

It appears evident from the above rules that "handle ties" are recognized by the Code, and I personally believe that two single pole breakers equipped with a "handle tie" will satisfy the simultaneous operation required by Section 2353 far better than when the handles are within $\frac{1}{2}$ in. proximity with no "handle ties".

Underwriters' Laboratories also recognize "handle ties" with the following advice:

"Some single-pole circuit-breakers, used individually or in a common base, rated 120 volts ac or 125 volts are designed to permit the simultaneous operation of two adjacent breakers, by handle ties or handle extensions, so that the two breakers may be used on a 2-wire circuit connected to the outside (ungrounded) wires of an Edison 3-wire system. Such breakers are tested together, in the intended manner as a 2-pole, independent trip breaker in the overload, endurance, short-circuit and dielectric-strength tests. Single pole breakers which have been investigated for use in pairs are identified by the rating of 120/240 volts ac, or 125/250 volts."

UL also recognizes two single-pole breakers with handle extensions (separate or integral) for the simultaneous operation of the two breakers when the clearance between the two handle extensions is not more than $\frac{1}{2}$ -in. (See page 43 of the 1951 UL Electrical Construction Materials List).

In view of the foregoing "handle ties" are recognized by UL and breakers so equipped are designed to satisfy the intent of simultaneous operation as required by the Code. It should be noted however that this only applies to "some circuit-breakers" and that they must be identified as above covered.—B.A.McD.



BIDDLE DIELECTRIC TEST EQUIPMENT

... for measuring direct current at voltages up to 100 kv when applied to the insulation of generators, transformers, bushings, cable, etc.

New

MODEL 2

current output 6 ma continuous at 100 kv

More and more engineers are leaning to d-c testing with voltages equal to or somewhat greater than equivalent peak alternating voltages. Their experience and increased knowledge and appreciation of the advantages of testing with direct voltage have accelerated the need for test equipment to meet field requirements.

IMPORTANT FEATURES

- Well-designed provisions for utmost safety
- Simple operation and reliable performance
- Excellent output voltage regulation
- Compact, mobile design
- Facilities for voltage and leakage current measurements



IMPORTANT APPLICATIONS

... in development ... for testing the d-c dielectric strength of insulating materials and the adequacy of the electric design of insulation in any type of electrical equipment.

... in production ... for non-destructively detecting defects in the insulation of electrical equipment due to design, material, and workmanship.

New

MODEL 1-A

3 ma continuous at 40 kv



... in maintenance ... for non-destructively detecting unreliable condition of insulation of new or repaired electrical equipment. Preventive maintenance tests on important rotating equipment, cable, switchgear, etc., result in appreciable savings.

For important details regarding these units and information on the subject of high voltage d-c testing write for our New Bulletin 22-ECM.

B-800

JAMES G. BIDDLE CO.

1316 ARCH STREET • PHILADELPHIA 7, PA.

ELECTRICAL TESTING INSTRUMENTS • SPEED MEASURING INSTRUMENTS
LABORATORY & SCIENTIFIC EQUIPMENT

James G. Biddle Co.
1316 Arch St., Phila. 7, Pa.
Please send me
BULLETIN 22-ECM

Name _____
Company _____
Address _____
City _____ Zone _____ State _____

WAGNER

Close-Coupled

Transformer

permits

compact

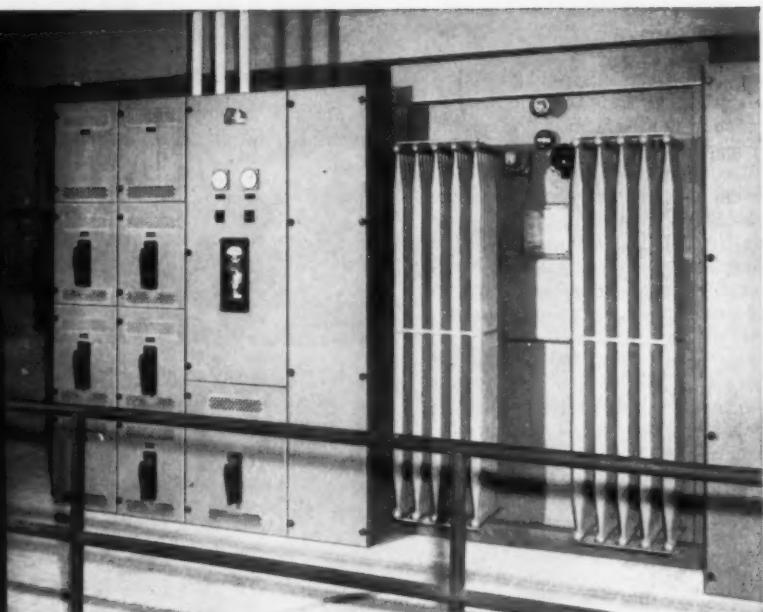
load-center

for TRANE

COMPANY



WT56-2



This Wagner 1000 kva Noflamol close-coupled Transformer is installed in Trane Company's new \$1,250,000 Engineering Building.

One of the many unusual features of The Trane Company's new Engineering Building at LaCrosse, Wisconsin, is a display room for the air conditioning equipment that serves the building. A full glass wall in this room permits visitors to view the Trane CenTraVac water chiller and master control panel, the pump room and the unit substation that handles the power load distribution for the building.

A Type JP 1000 kva Wagner close-coupled transformer was chosen to power the unit substation. Wagner close-coupled transformers fit flush against the switchgear enclosures, eliminating throats and saving space. Connections are made at the bushings on the sides of the transformer. Bushing heights are designed to give ample room for connection to switchgear or busses and eliminate need for special throats to match special switchgear. These noninflammable liquid-filled transformers are available in ratings from 500 through 2000 kva.

Consult your nearby Wagner Sales Engineer about the complete Wagner line of Unit Substation Transformers — both liquid-filled and dry-type. Bulletins TU-205 and TU-214 give full information on Wagner Unit Substation Transformers for industrial power needs. Write for your file copy today.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6413 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

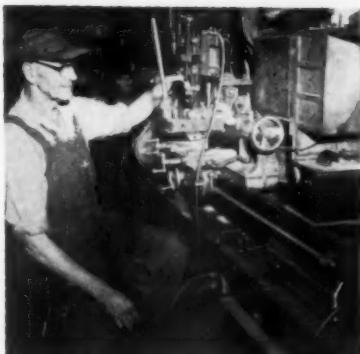
Motor Shops

Commutator Undercutter Attaches To Lathe

Carl Thornell one of the owners of Electric Motors Unlimited in Madison, Wis., has devised a machine to undercut commutators with exacting speed. The unit, consisting of 1/10-hp motor with attached arbor and cutting blades, is bolted to two upright rails with a screw centering adjustment. It rests on four ball bearing wheels that permit motor support to ride back and forth on a short steel-rail frame attached to the tool-post slide on the lathe bed.

The unit can be used for undercutting both axial and radial commutator slots on armatures supported between the lathe chuck and tail stock spindle. Cutter traverse for axial slots is provided by turning the hand wheel on the tool post carriage. For radial slot undercutting, the tool post carriage remains stationary in a predetermined position. Back and forth cutter traverse (at right angles to lathe bed) is provided by hand lever arrangement pin-mounted to the assembly base and movable motor support.

Circular cutting blades vary in size. For the general run of work coming into the shop, a 21/32-in. O. D. blade with a 3/16-in. bore is used. A shaded lamp, attached to the motor base, provides good sup-



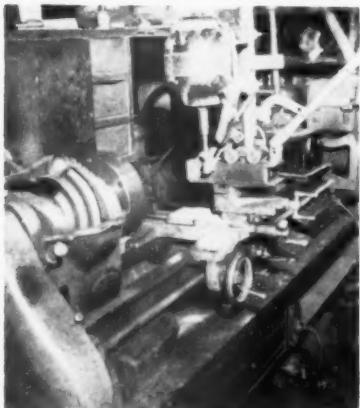
CARL THORNELL is pictured with machine he designed and installed in an old lathe to undercut both vertical and horizontal commutators with exacting speed.

plementary lighting on the commutator slots and undercutting tool.

The device, constructed completely from scrap parts and materials, has been used on armatures up to 7½ hp. The machine was built as only a working model, but because it has proved it can do the job it was designed for, no attempts have been made to change it. In fact, under normal conditions it will undercut a 95-bar commutator in five minutes.

Warning Tag for Dual-Voltage Motors

A warning tag is attached to all dual-voltage motors sold or repaired by Electric Motor Service, Kennett Square, Pa., to call the attention of customers to the fact



UNDERCUTTER ASSEMBLY features adjustable vertical support for motor and cutter arbor; lever-operated mobile arrangement for radial slots. Complete unit mounts to cutting-tool carriage on lathe. In this position, unit is set for radial slots.

that motor connections should be made in accordance with the power supply which is available.

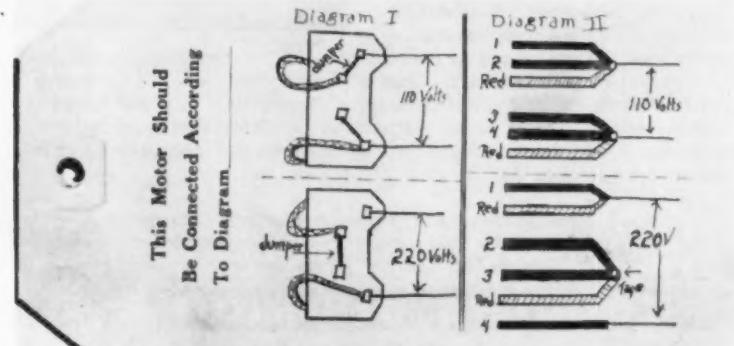
These various connection diagrams are sketched on the reverse side of the tag so that, by following the diagram, the customer can install the unit without facing the possibility of burned-out coils.

Obviously as this advice seems, it was surprising to notice the number of formerly encountered hook-up problems that have been eliminated by this simple precaution.

Use Metal Pallets to Move and Stack Motors

Management of the electric motor repair division of Barker-Fowler Electric Co., Lansing, Mich., constantly keeps an eagle-eye and sharp ear turned to new equipment and ideas that will simplify shop operations and increase manpower efficiency. Material handling, particularly moving and storage of used motor stocks, is a category under continuous surveillance. As a result, moving a motor now is practically a one-man chore.

Motors and spare heavy equipment are stored in a large basement area equipped with a long truck ramp to street level. Basement loading and unloading of trucks was possible, but getting the motor on or off the truck bed and into sturdy wood storage racks presented a problem. This was solved by the acquisition of a battery-powered electric fork lift truck. But the need for more racks became pressing.



CONNECTION DIAGRAMS remind customers that their motor is a dual-voltage unit and that connections should conform to available power supply.

NOW...GLOBE OFFERS...

two new INTERCHANGEABLE trays for support of cables, wiring and tubing

- ★ Engineered for uniform design and easy installation
- ★ Steel or aluminum construction
- ★ Complete accessories for SPEEDIER Installation
- ★ No sharp edges to damage cables
- ★ Complete interchangeability



Now, for the first time, two types of cable trays, one a ladder type and the other a basket type, are available to be used INTERCHANGEABLY at any given location, depending on the type and weight of the cables to be suspended. The advantages of each type tray can thus be used to the fullest extent. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is intended for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants, in modernization, and for power distribution in all types of manufacturing processes. A new catalog, just off the press, gives full information and installation techniques. Ask for your FREE copy today.

Distributors are to be found in all principal cities—
consult the yellow pages in your phone book under
"Gratings" or "Conduits" for the one nearest you.



100

PRODUCTS DIVISION

The GLOBE Company MANUFACTURERS SINCE 1914

4032 SOUTH PRINCETON AVENUE, CHICAGO 9, ILLINOIS

180

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . JANUARY, 1958



FORK LIFT truck raises and moves steel pallet containing group of ten motors. Note pallet stack at left adjacent to permanent storage rack.



FOURTH TIER is added to pallet stack of motors around basement column. Note wood separators between motor frames and steel pallet being lowered into position. Pallet technique adds flexibility to storage arrangements.

Then, Mason Green, B-F manager of motor sales and service, noted the announcement of a plant equipment auction. Steel pallets were included in the list of items. He bid for, and secured, the lot. Now they are being used to move and stack motors in the Barker-Fowler shop basement.

The pallets are constructed of corrugated steel and are the reversible platform type with a center steel support forming two large "cells" to accommodate the lift fork. Each pallet is 4 ft long, 3 ft wide and 5 in. deep (end cross-section: two 18-in. by 5 in. rectangular cells). From four to ten or more motors, depending on frame size, can be placed on each platform.

Since the reversible feature provides two flat, large-area, surfaces on each steel platform, groups of motors can be pallet-stacked four and five tiers high in a permanent storage arrangement. No racks or shelves are necessary.

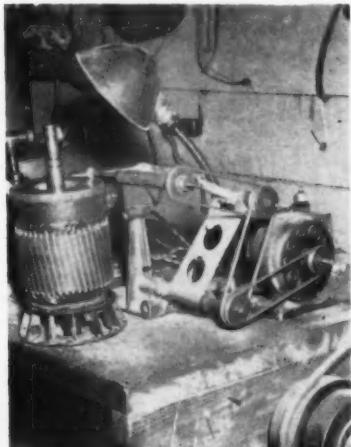
When motors are stacked in this

manner two points must be kept in mind: at least four of the largest motors, at the corners, should be approximately the same frame size; and wood separators (2 by 4's or small planks) should be placed between the motors and the pallet on top to prevent slippage and maintain balance. Metal on metal does tend to slide, particularly if there is a slight tilt to the stacked pallets.

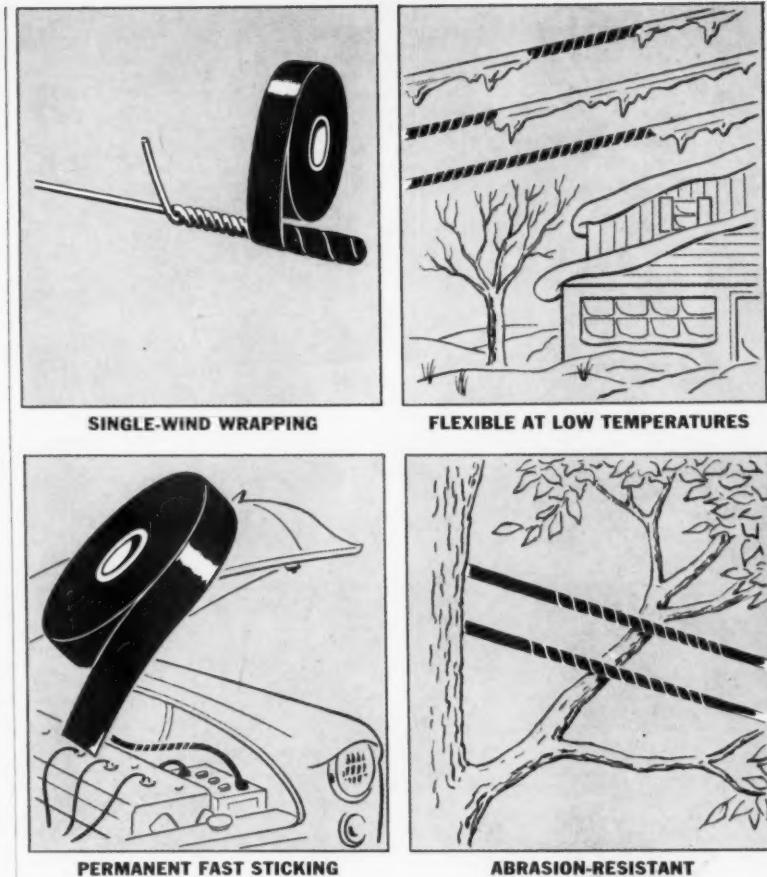
From an overall viewpoint, pallet storage of motors has worked well at the Barker-Fowler shop. Groups of motors can be economically handled and storage arrangements can be tailored to fit existing requirements. Normally, pallet stacks contain motors of similar horsepower range and frame size and each motor is individually tagged for quick identification.

Mica Undercutter Has Articulated Mounting

Those who have had the dubious pleasure (?) of studying the mounting details of a dentist's belt-driven articulated-arm drilling rig can easily picture the mechanics of this small-unit undercutting wheel which is used in the shop of the Electric Motor & Service Company of Steelton, Pa. Powered by a fractional-hp blower motor, a 3-pulley pivoted-arm assembly is used to spin a $\frac{1}{4}$ -in. cutting saw. Motor and lower pulley are secured in their positions, but the saw may be raised or lowered, pulled forward or moved backwards, since



THREE - PULLEY pivoted belt - driven assembly spins small undercutting wheel and permits free movement of rig up or down, back or forward, while local lighting is directed upon cutting area by adjustable goose-neck reflector.



OUTSTANDING ONE-WRAP PRIMARY INSULATION

Porter[®] QUIK-STIK POLYETHYLENE ELECTRICAL TAPE

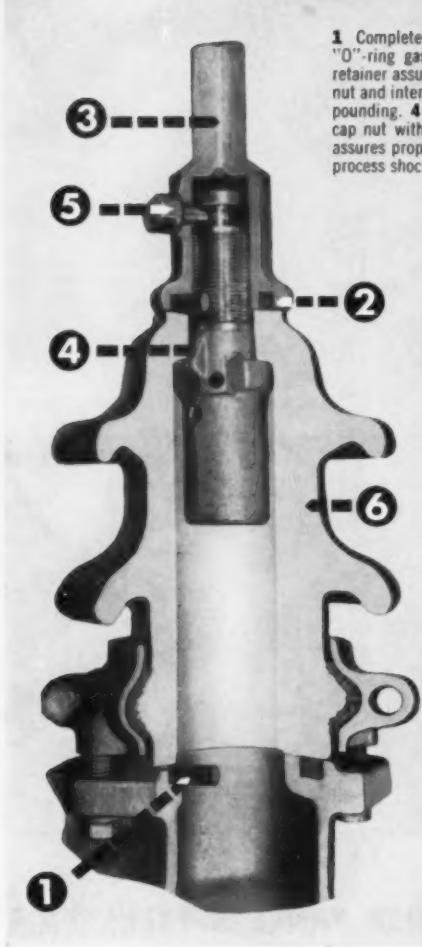
- IDEAL FOR ALL OUTDOOR AND INDOOR, UNDERGROUND OR OVERHEAD WIRING, IN UTILITIES, ELECTRONICS, AIRCRAFT, AUTOMOTIVE, AND GENERAL USE.

- Permanent strong tack—sticks anywhere!
- Stays flexible from minus 70° F to plus 200° F.
- Dielectric strength more than 10,000 volts; uniform power factor over wide frequency range.
- Low moisture-permeability, high corona-resistance.
- Resists acids, alkalies, oils, solvents, fungus, bacteria, gases.

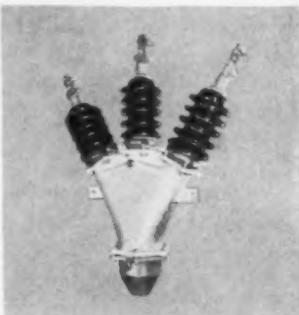
GET FULL INFORMATION on new Porter QUIK-STIK polyethylene tape by writing Quaker Rubber Division, H. K. Porter Co., Inc.; Philadelphia 24, Pa., or Pittsburg, California.

H. K. PORTER COMPANY, INC.

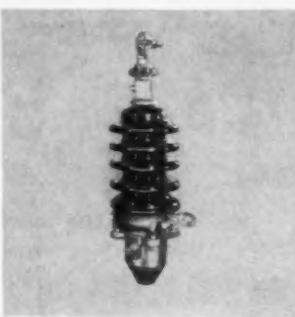
QUAKER RUBBER DIVISION



1 Completely enclosed and trapped neoprene "O"-ring gaskets can't flow. **2** Controlled-stress retainer assures long gasket life, tight seal. **3** Hood nut and internal connector vented for voidless compounding. **4** Keyed connector permits tightening cap nut with single wrench. **5** Positioning guide assures proper permanent tightening. **6** Best wet-process shock-resistant porcelain bushings.



Wide range of sizes and entrance fittings, with corrugated or petticoat-type bushings, meets most outdoor and indoor cable-sealing applications. Available with either three conductors (above) or single conductor (below).



Delta-Star Permanently-Sealed Terminators keep air and moisture out for good

2500 to 15,000 volts. Delta-Star SEAL-KAP Terminators reduce servicing problems. The special neoprene "O"-ring sealing design of this line of cable terminators results in a *permanently* air-tight and moisture-proof installation. Original cost, in addition to installation and maintenance costs, is low.

SEAL-KAP terminators are made in single- and three-conductor

styles for both outdoor and indoor service. Lightweight cast-aluminum bodies help make SEAL-KAP terminators easy to handle, contribute to their economy of installation.



GET COMPLETE INFORMATION in this new SEAL-KAP Terminator catalog. Write DELTA-STAR ELECTRIC DIVISION, H. K. PORTER COMPANY, INC., 2437 Fulton St., Chicago 12, Illinois. District offices in principal cities.

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION



COMMUTATOR being undercut is maintained in upright position by means of metal collar which supports work, yet permits rotation of commutator as undercutting progresses from slot to slot.

the double-arm rig can be cantilevered into any position desired.

A small metal stand, secured in front of the cutting device and bolted to the work bench, permits the commutator being undercut to remain in an upright position at all times, while good illumination at the point of cutting may be obtained by adjusting a flexible goose-neck lamp, which is also visible in the accompanying illustrations.

Gravity Conveyors Feed Shop Will-Call Counter

A gravity conveyor system minimizes handling of incoming and outgoing small motors at Kirkhof Electric Company's motor repair shop in Grand Rapids, Mich. Two parallel 20-ft sections of "rollerskate" conveyor (skate wheels provide the rolling surface) connect the repair department with the customer will-call counter in front of the shop. Tilted slightly in opposite directions, to take advantage of gravity feed, one section carries motors into the repair area; the other brings finished work to the will-call storage shelves.

Both conveyor lines are made up of two 10-ft lengths supported on a sturdy angle-iron frame at a convenient 36-in. working height. One end of the 20-ft line is raised about 4 in. above the other to provide the gravity incline. Space under the conveyor frame is used for small parts and accessory storage cabinets and empty tote pans.

Metal tote pans ride the 12-in. wide conveyor track. All pans are 11 in. wide, 15 in. long and about 3 in. deep. Work coming in across

ONE SOURCE FOR EVERY INDUSTRIAL LIGHTING NEED!



SOLID NECK LINE Sturdy, attractive one-piece units provides quality illumination at low cost for Factories and Warehouses.



"FLO-LINER" Smartly styled shallow lighting units for any Commercial or Office installation.



"BI-FLO UPLIFTER" 72% downlight — 28% uplight, provides greater seeing comfort for industrial areas such as Assembly Lines.



"D" LINE High efficiency, all-purpose fixtures with upward component of light to relieve severe brightness contrast. Ideal for Machine Shop and Factories.

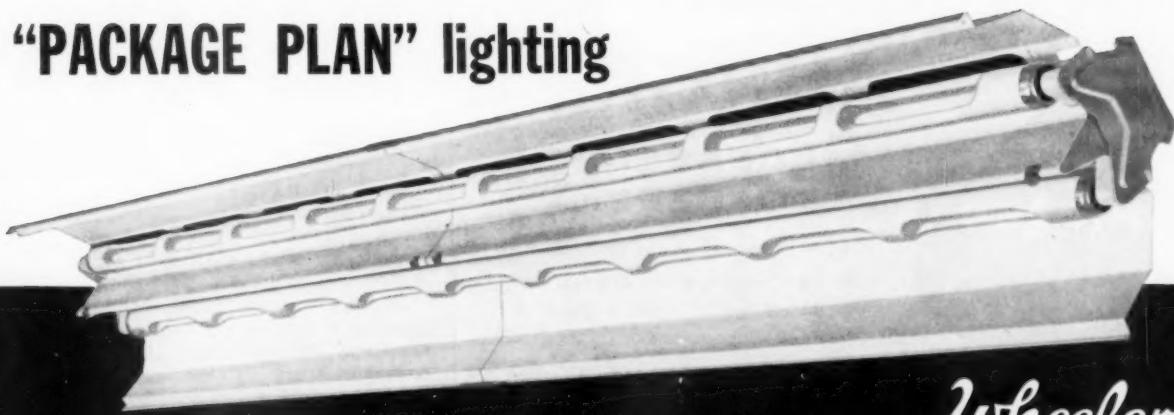


DURATACH LINE Rugged fixture that offers easy, low cost maintenance plus complete interchangeability. Widely used in Industrial and Textile plants.



"DUST-TIGHT" and "VAPOR-TIGHT" Special fixtures for hazardous and non-hazardous locations such as Printing Plants, Flour Grain Mills, etc.

and now **Power-Lume**
latest addition to *Wheeler*
"PACKAGE PLAN" lighting



Power-Lume by Wheeler — a new fixture in 2 types of Construction
"F" and "V" . . . specifically designed to utilize fully the extra
illuminating power of the new Power-Groove lamps. Delivers TWICE the
amount of lumen output per foot of lamp length! For complete
details, write for New Product Data Sheet No. 100 D.

Wheeler

REFLECTOR COMPANY

(Division of Franklin Research Corp.)

275 CONGRESS STREET
BOSTON 10, MASS.

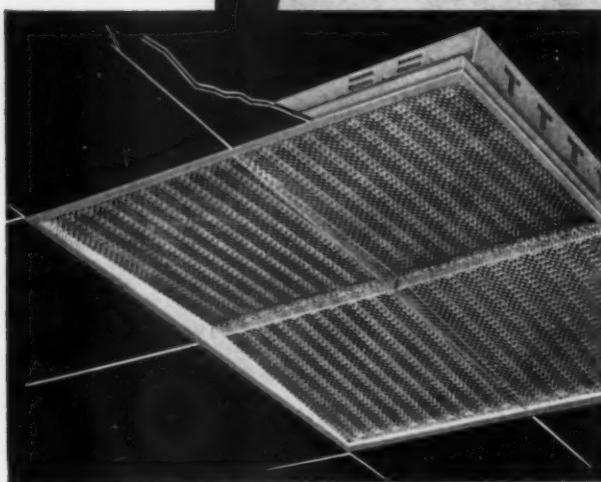
Distributed Exclusively Through
Electrical Wholesalers

no light leaks

new extruded aluminum

light-tight

trim and frame



one of many new engineering features

in new

AURORA

RECESSED TROFFERS

- New shallower design
- New plastic, glass & metal shieldings*... glass to glass in continuous run
- Safe low temperature operation
- Standard one foot widths plus 2 x 2, 2 x 4, 4 x 4

*Holophane licensees

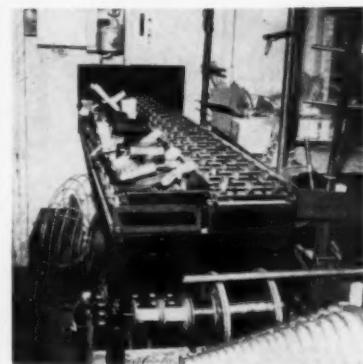


sold only through qualified
electrical distributors

METALCRAFT PRODUCTS CO., INC., MASCHER & LIPPINCOTT STS., PHILADELPHIA 33, PA.



DUAL CONVEYORS bring repaired motors from shop (left) to will-call counter and carry items for repair into shop (right). Tote pans ride down incline on conveyor wheels. Here shop supervisor B. B. Hinkley stores finished work on shelves to await customer pick-up.



SHOP END of conveyor system projects through partition separating customer will-call counter from shop proper. Tote pans on left contain motors just received for repair. Work orders are attached to each item.

the counter is checked, and a repair order is written. Both item and order are placed in a pan on the "in" conveyor and a slight push sends it into the repair department. Pans with finished work and completed order forms are shop-loaded on the other conveyor line and end up at the will-call counter. Here, repaired motors are carefully checked with the work order and placed on storage shelves to await customer pick-up.

Shop supervisor B. B. Hinkley reports a noticeable increase in shop operating efficiency since the conveyors were installed. Economy of time and effort are obvious. And this light touch of mechanized material handling undoubtedly impresses customers as they see it in action while leaving or picking up repair work.



ALLIS-CHALMERS
individually enclosed **LOW VOLTAGE BREAKERS**

Deep
removable
cover



simplifies
breaker inspection
... adjustments

For fast, complete breaker inspection, use Allis-Chalmers individually enclosed low voltage breakers. Removing only the cover, instead of the entire breaker, provides full, easy access from all angles.

Easy installation, inspection, and operation are yours with Allis-Chalmers breakers. Get complete details. Call your nearby A-C distributor or office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS



A-5565





Revere's No. 5440 mercury Ultra-Lites and hinged poles installed at Watson Village shopping center, Glendale, Missouri. Uniform, square light patterns produced by Ultra-Lites eliminate "dark spots"; wide coverage reduces pole requirements 50% to 75%.

The facts of light:

Widest line of matched lighting fixtures does widest variety of lighting jobs

From parking lots to race tracks . . . from street lighting to such varied applications as underwater lighting for swimming pools or airport marking and approach lighting — Revere offers you the industry's widest line of matched outdoor lighting fixtures.

One responsible source provides the equipment you need — matched to "fit" together for easiest in-

stallation. On-time deliveries of components are carefully scheduled to meet your job requirements.

Whether your project calls for incandescent, mercury or fluorescent lighting, check with your electrical wholesaler on the many advantages of Revere equipped installations. Revere's only business is outdoor lighting. Write for catalog covering Revere's complete line.



Revere Electric Mfg. Co., 6009 Broadway, Chicago 40, Ill., Uptown 8-7100
Available in Canada thru Curtis Lighting, Ltd., Leaside, Toronto, Ontario

OUTDOOR LIGHTING: Industrial • Commercial • Service Stations • Streets • Sports • Airports • Shopping Centers

Chicago area race track is illuminated with Revere "2000" series long range floodlights mounted on grandstand roof, and No. 3803 Elliptor Floodlights mounted on Revere Hinged Poles No. 199-D-30. Light intensity at finish line is built up by aiming floodlights toward that area.



In The News

National Electrical Week to be Observed February 9 to 15

Next month the electrical industry will observe National Electrical Week, February 9 to 15. The event is an opportunity for all of the industry to tell its story—from Edison's lamp through atomic power and beyond—in terms of better living for all America.

The Week, now in its third year, grew out of a program originally sponsored by the International Association of Electrical Inspectors. It is now sponsored by the leading electrical industry trade associations and many other industry groups.

In cooperation with NEW, a committee of association executives and business paper editors have compiled a broad summary of the measurements of the electrical industry. The reports show that among the chief contributions to the electrical industry are the electrical machinery and appliance manufacturers; the electric utilities; the electronics industry; the radio and television broadcasting industry; electrical contractors and maintenance firms; electric wholesale distributors, the communication industry and electrical engineering and construction firms.

Customers: Practically every man, woman, and child in the nation is a customer of the industry. The utilities furnish service to some 47.4 million residential customers, and the appliance industry has sold at least one radio and re-

frigerator to 96% of these customers. The telephone companies provide service for some 63 million phones—an average of one telephone for every three persons in the country.

Production: During 1957 the industry turned out a minimum of \$56.2 billion worth of goods and services, accounting for more than one-eighth of all the goods and services produced by all business and industry in the country during the year.

Growth: Also during 1957 the electrical industry put \$8.2 billion into expansion of its plants and buildings—some 21.2% of all money spent by industry for expansion. And during the year ahead the industry generally will increase its capital spending despite plans by total U.S. industry to level off or cut back capital spending.

Employment: The industry, at a minimum, employs one out of every 20 workers in the country.

Ownership: The electrical industry has nearly 7 million direct owners and some 97 million indirect owners.

The NEW Committee has prepared planning guides and promotional materials for the use of those desiring to tie in with the activity at the local level. For information on such aids and their costs see your local electrical league or utility, consult your

trade association or write to National Electrical Week Committee, c/o Fleishman-Hillard, Inc., 407 N. 8th St., St. Louis 1, Mo.

BIGGEST UTILITY CONSTRUCTION PROGRAM AHEAD

The electric industry reached its 75th year in 1957, continuing during the year its record of remarkable postwar growth, and its constantly increasing service to American life, economy and defense, says J. W. McAfee, President, Edison Electric Institute and Union Electric Company.

In the past seven years, or less than one-tenth of its history, electricity generating capability and production have each increased by over 90%, while sales have doubled. Average annual use of electricity per residential customer has increased by 1334 kilowatt-hours, the seven-year increase alone being greater than total use per residential customer only 11 years ago.

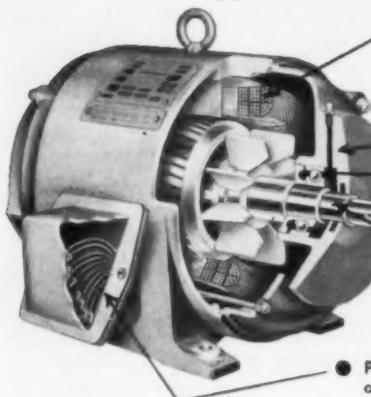
Generation of electricity by all components of the industry totaled 636 billion kwhr, an increase of 35 billion over 1956; sales of electricity reached 561 billion kwhr, an increase of 31 billion for the



ANNUAL MEETING of Fischbach & Moore, Inc., electrical contractors, New York City, was held in Cincinnati during the week of the convention of the National Electrical Contractors Association.

STAMINA of BROOK A.C. MOTORS is no coincidence!

Design is based on over half a century of experience. Built to surpass NEMA Specifications, yet cost no more than ordinary motors. Single and polyphase. All major types. 1 to 600 HP. Shipped from stock.



world's most respected motor

BROOK MOTOR CORPORATION

3553 W. PETERSON AVE., CHICAGO 45, ILLINOIS

Factory Representative, Warehouses, Dealers, Service Stations, in Major Cities.

SYNROFLASHING protects this roof from moisture leakage... mast vibration damage



All Blackhawk service entrance mast kits feature this new synroflashing unit. It's a neoprene roof flashing unit that absorbs mast vibrations in the collar area. The mast can't work loose, damage shingles or give moisture a place to seep in.

Synroflashing is weather proof and weather resistant. Won't crack, peel or rot no matter what the atmospheric conditions. Synroflashing units on the Blackhawk Service

Entrance Mast will give long years of dependable, trouble-free performance. Units are easily installed. They simply slip over the pipe and are pushed down to the roof. Shingles fit over it easily. Synroflashing units are available for 2" and 2½" pipe.

Blackhawk service entrance masts, with Blackhawk's famous Slip-Fitter head and new Synroflashing, can be sold as complete kits or as separate fittings.

Blackhawk Industries, Dubuque, Iowa
Where the new ideas come from



THREE NISA OFFICIALS hear explanation of control panel construction at Cutler-Hammer plant in Milwaukee during the NISA board's mid-year meeting November 14-16. From left: William J. Wheeler, Sr. of The Maintenance Co., New York; Joseph M. Harrington, NISA executive vice-president; and Alfred Elson Jr., NISA president. Guide at right is John Ritsch.

year; and average annual use per residential customer increased 195 kWhr to reach a total of 3164.

An additional 85 billion kWhr generated by industrial and railway plants pushed the grand total of electricity production in the USA to 721 billion kWhr during the year.

During 1957, approximately 8.5 million kilowatts of new generating capability were added to the nation's power lines, bringing the total generating capability to 135 million kw by the end of December.

The year 1958 begins with by far the largest construction program yet undertaken including the scheduling of 16.25 million kw of new generating capability to go into service in 1958, as well as extensive construction of new transmission and distribution lines.

The installation of new generating facilities in 1958 will exceed the previous high record of 1955 by almost 4 million kw, and is about equal to the total net installations of the ten years between 1937 and 1947.

During the next decade it is estimated that more than 130 million kw of net generating capability will be added to the present total.

The additions already scheduled (or on order) for 1958 and later include nearly 40 million kw in steam plants and a little more than 5 million in hydro installations. Of this total of 45 million kw, 37 million are planned for installation by investor-owned companies. The remaining 8 million have been scheduled by the Federal government and other public agencies.

Manufacturer Predicts Higher Sales in '58

Sales billed of Westinghouse products will reach the highest peak in the company's history in 1957, approximately \$2,000,000,000 and are expected to be even higher in 1958, according to Gwilym A. Price, chairman of the board, Westinghouse Electric Corp.

The increased billings next year will result from the overall steady growth of the electrical industry, from an expected modest increase in sales of consumer products and from the increasing emphasis on electrical and electronic components in defense equipment, particularly missiles.

Sales by the electrical manufacturing industry in 1958 will be bolstered by backlog and orders from the electric utilities for the heavy electrical generating equipment needed to meet this continuing growth, as well as new orders for distribution equipment to support the large quantities of generating equipment installed in the past three years.

In addition, steady demand is expected for electrical machinery in industry, since this equipment plays a fundamental part in developing more efficient production methods and cost reduction.

Overall, the industry's backlog for the end of this year will probably be approximately \$10 billion.

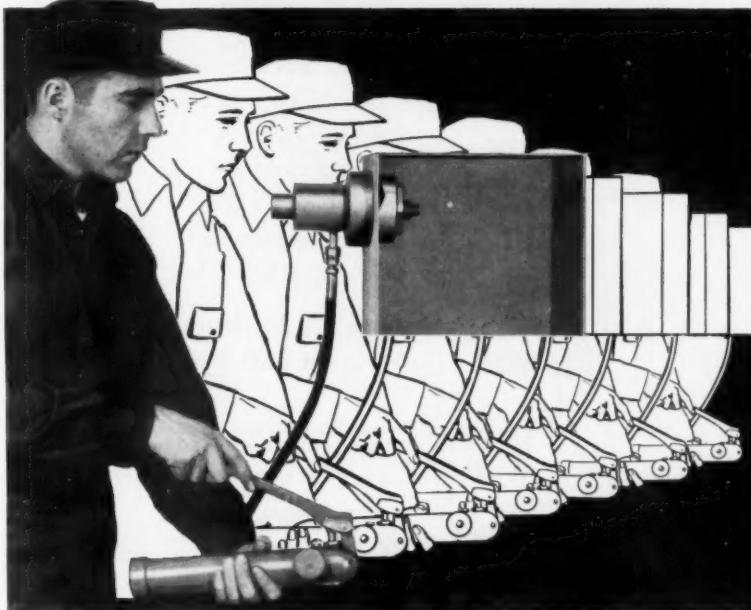
The Westinghouse share of the heavy apparatus business, plus a substantial backlog, will result in a moderate increase in sales of this equipment in 1958. However, new orders may be below 1957, the second best year in the company's



AT NISA DIRECTORS' mid-year meeting in Milwaukee, from left: J. Arthur Turner Jr., Tampa (Fla.) Armature Works; Paul Sievert of Sievert Electric Co., Chicago; and John W. Overton of Electric Motor Repair, Richmond, Va.

By Saving Minutes, You Save Hours

...WITH THE **GREENLEE** HYDRAULIC
KNOCKOUT PUNCH DRIVER



You make smooth holes for up to 5-in. conduit *in seconds* with the GREENLEE No. 7646A Hydraulic Knockout Punch Driver . . . and the valuable minutes you save on every hole quickly add up to hours! This small and handy, yet extremely powerful, driver operates all GREENLEE Knockout Punches and is recommended for cutting entirely new openings in metal through 10 gauge. A few easy strokes of the handle, and the slug drops loose in the die! Ask your distributor for this timesaving drive—to use with your present GREENLEE punches—or the handy sets, including punches, shown below:



Set No. 7306, with punches for 1/2"-2" conduit



Set No. 7310, with punches for 1/2"-4" conduit



No. 7646A Hydraulic Knockout Punch Driver



Set No. 7304
—4 punches for
2 1/2"-4" conduit
Knockout Punch No. 743
is available for
5" conduit



WRITE for illustrated bulletin giving full details and prices.



GREENLEE TOOL CO., 1741 COLUMBIA AVENUE, ROCKFORD, ILLINOIS, U.S.A.

Black & Decker TOOL OWNERS AGREE
Let the men who
make 'em-fix 'em!



Swifty Service says:
 "Local Black & Decker
 Factory Branch
 Service
 means longer life,
 better performance
 for your B&D Tool!"

Free Tool Inspection
Standard B&D Guarantee

Look under Tools-Electric in Yellow Pages
 or write us for address of nearest Factory
 Service Branch. THE BLACK & DECKER
 MFG. Co., Dept. S3101, Towson 4, Md.



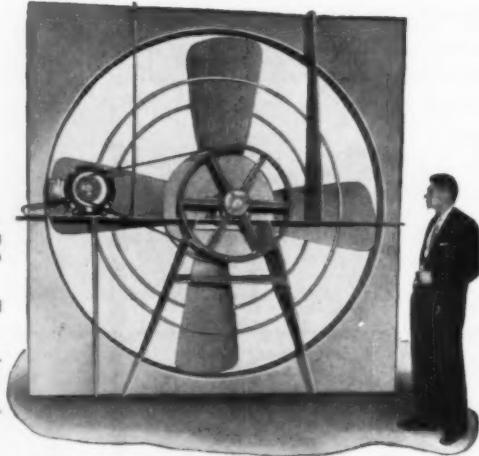
Black & Decker®
 QUALITY ELECTRIC TOOLS



24" - 120" SIZES!

ONLY "BUFFALO"
OFFERS THIS
COMPLETE LINE OF
HUSKY, EFFICIENT
PROPELLER FANS

- Opens the door to many big jobs formerly possible only with costly fans!
- Wide choice of models for special applications!
- Package design—easy installation as ready-to-run units!
- A new high in propeller fan performance and durability!



WRITE FOR BULLETIN FM-315 for full details!

BUFFALO FORGE COMPANY

520 Broadway

Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS — BELTED VENT SETS — PROPELLER FANS — "E" BLOWERS-EXHAUSTERS



history for bookings of apparatus products.

Prospects for improvement in the consumer products field are hinged to a modest increase in residential construction and the continued rise of personal consumption expenditures even though the rate will not be as rapid as in the past several years.

NISA News

The period after the Buffalo convention through the end of 1957 has been the busiest in NISA history. National president Alfred Elson Jr., sometimes accompanied by Mrs. Elson; executive vice-president Joseph M. Harrington; consultant Fred B. Wipperman; engineer Hank Lankford; and *NISA News* editor Horace Barks have traveled thousands of miles from north to south, coast to coast and into Canada to address chapter meetings, visit shops and plan for coming events, including the all-important Jubilee Celebration in New Orleans in May.

Mid-South Chapter held a highly successful meeting in Chattanooga, Tenn. on December 7 at Hotel Patten. Sixty attended, one of the largest crowds in the group's history. Ray Reading, chief engineer of Belden Manufacturing Co. talked on magnet wire insulation; Sherman Paul, area director of the Dale Carnegie Schools, spoke on selling; Alfred Elson Jr. and Joseph M. Harrington of NISA also addressed the group. Leaders of discussions at an afternoon program were: Bruce Tomlin of the Dept. of Labor;



JAMES A. COVERT of Covert Electric Machinery Co., Joplin, Mo. and Joseph E. Beyer Jr. of Hilton Electric Co., Hutchinson, Kans. at November 8 meeting of Heart of America Chapter of NISA at Pittsburg, Kan.



DR. JACK WILSON, chief physicist of Louis Allis, demonstrates coil in his laboratory to visiting NISA directors Murphy Miller, Tennessee Electric Motor Service, Knoxville, Tenn. and Carl Lundberg, Cascade Machinery Co., Seattle, both NISA directors attending the mid-year board meeting in Milwaukee November 14-16.

Henry Winkleman, Tri-State Armature Works, Memphis, Tenn.; and Walter Brush, Electric Motor Service, Birmingham, Ala.

NISA's 36th new chapter, Miami Valley-Ohio, held its first meeting with a program on December 16. Principal speaker was Richard Wareham of Special Electric Co., Milwaukee, distributors of water-reducible varnish. The meeting was held in Dayton, Ohio, center of the chapter's area.

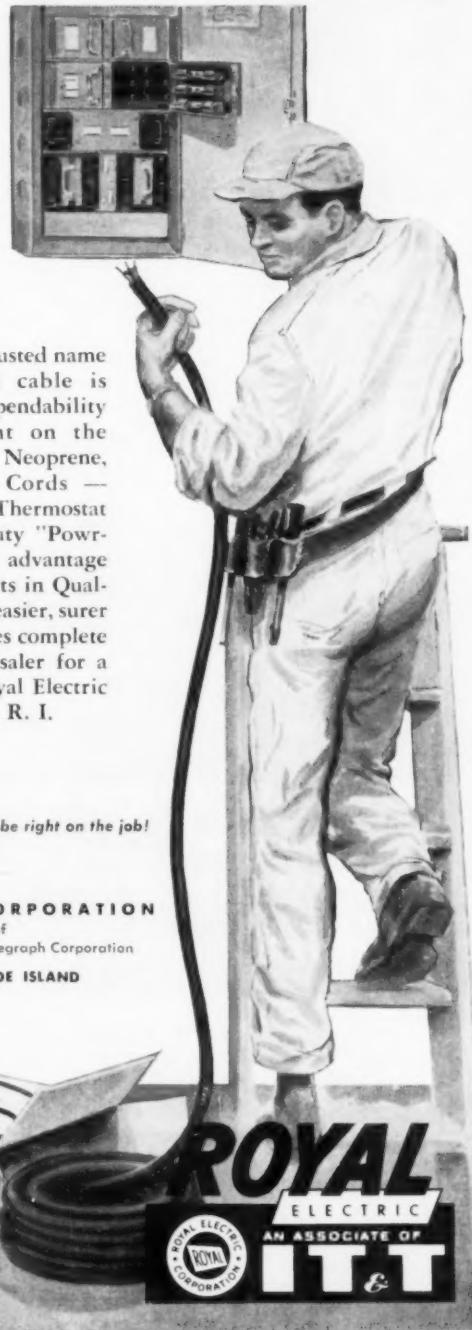
Industry figures are eagerly awaiting the results of the first NISA-NEMA survey, mailed January 15 to several thousand service shops throughout the U.S. The survey asked four questions, each to be answered in two parts, for 1956 and 1957. Questions included total volume of repair service, volume of service on transformers 500 kva and below, volume of service for all motors, generators and m-g sets with estimated percentages of fractionals, integrals from 1 to 200 hp and over 200 hp, and total employees. It is the first comprehensive survey of its kind in the industry's history.

A cordial invitation to non-member shops has been extended by executive vice-president Joseph M. Harrington of NISA to attend the Jubilee Celebration—NISA's 25th anniversary convention—May 11-14 in New Orleans. "Non-members will get a quick idea how important NISA membership can be to them," Harrington said. "We believe we have one of the outstanding trade associations in the country. Our dues structure is such

Contractors and maintenance men

DEPEND ON ROYAL
ELECTRIC

RUBBER JACKETED CORD



No doubt about it, the trusted name in portable cord and cable is ROYAL. Wherever dependability counts, you can count on the ROYAL line of Rubber, Neoprene, and Plastic Jacketed Cords — Machine Tool Wire — Thermostat Cable — and Heavy Duty "Power-Kord" Extensions. Take advantage of Royal Quality Products in Quality Packaging for faster, easier, surer wiring. Catalog 4-54 gives complete details. Ask your wholesaler for a copy today, or write Royal Electric Corporation, Pawtucket, R. I.

Made RIGHT... to be right on the job!

ROYAL ELECTRIC CORPORATION
an associate of
International Telephone and Telegraph Corporation

PAWTUCKET • RHODE ISLAND

ROYAL
ELECTRIC
AN ASSOCIATE OF
T&T

Splices
FOR WIRE
OR CABLE?

this PLM catalog
speeds up ordering
and installing!

You can wrap up details fast on splicing and terminating needs with this handy, up-to-date aid in planning and ordering.

The PLM line includes a complete range of splicing accessories for making 2, 3 or 4-way splices in or to armored cable (both open and sealed types), non-metallic sheathed cable and lead-covered cable through 23 kv. Unit package kits contain all materials and instructions needed for building correctly designed splice or termination.

Save time and work in getting correct materials to the right place at the right time. Ask for copy of PLM catalog 301. PLM Products, Inc., 3875 W. 150th St., Cleveland 11, Ohio.

TERMINATORS • SPlicing KITS • CONDUIT VENTILATORS



PORTABLE POWER

WHENEVER AND
WHEREVER YOU NEED IT

WINPOWER ELECTRIC PLANTS



750 watt to 2250 KW

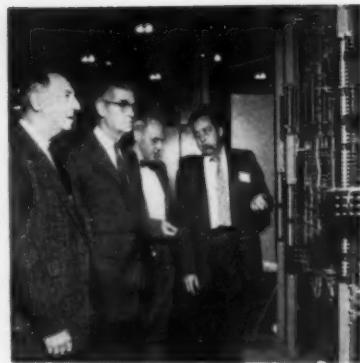


750 watt to 2250 KW
Other units from
400 watt to 100 KW

Wherever the job—whatever the need—you can count on WINPOWER electric plants to meet your requirements. Low cost, instant power on the job speeds up production by operating time and labor saving tools. More than thirty years of experience guarantees top performance and long life. Portable cradle units or two wheel dolly types. The complete new line—all voltages and phases—is priced to beat all competition.

For dependable power—it's WINPOWER. Write for free brochure and complete information. No cost. No obligation.

WINPOWER MFG. CO., Dept. G-31, NEWTON, IOWA



AL BECKER (right) of Cutler-Hammer Co. explains a control panel under construction at the manufacturer's 30th Street plant in Milwaukee to NISA directors (from left) Joseph Dudley of Dudley Electric, Flint, Mich.; Tom Paul of Paul Electric, Sioux City, Iowa; and Paul Sievert of Sievert Electric, Chicago. The directors were in Milwaukee attending the NISA board's mid-year meeting, Nov. 14-16.

that membership is truly a value no shop can afford to pass up. We invite inquiries from qualified shops and invite them to attend the New Orleans Convention."

Shops interested in additional information about NISA and the Jubilee Celebration should write Mr. Harrington at NISA headquarters, 818 Olive St., St. Louis 1, Mo.

Harold Patchett of the Industrial Electric Co. of Everett, Wash. was host at the Puget Sound Chapter meeting in his city on December 10. Richard Abraham of General Electric Co., a service representative, was chief speaker.

One of the largest "local" meetings in the Southwestern Chapter was held in Dallas, Tex. on November 6. Twenty-four, including several from Fort Worth, attended the meeting at the Downtown Club. Host was Al Grayson of W. M. Smith Electric Co., Dallas. The Southwestern Chapter meets twice annually, but there are several local or regional groups that have been meeting with increasing frequency.

A "condensed directory" of NISA shops in New England, listing the lines handled by each member, has been distributed by Robert L. Sandman, secretary.

NISA's board of directors met in Milwaukee November 14-16, meeting in three morning sessions and spending the afternoons touring local plants and the evenings conferring with manufacturers of electrical equipment. Plants visited included Cutler-Hammer, Allis-Chalmers, Louis Allis and Allen-

Bradley. Allis-Chalmers entertained the directors at a dinner on November 14 and the NISA board entertained officials of several major manufacturing and distributing firms at a dinner on November 15.

Officers of Greater Cleveland Chapter include: President, Walter Kane, Kane Electric, Cleveland; vice-president, George McKeowan, MQN Electric, Willoughby, Ohio; secretary, Earl Jolley Jr., Electrical & Mechanical Service, Elyria, Ohio; and treasurer Lee Ruppersberg, Reserve Electric, Cleveland, Ohio.

An important regional meeting is the forthcoming Northwestern Conference, to be held on March 8 at the Bond Hotel in Hartford, Conn. It will be a jointly-sponsored meeting of the Connecticut, New England and New York chapters.

Indiana Chapter met on November 16 at Lafayette, visiting the Kirby Risk Electric Motors, Inc. plant. New officers are: president, Stanley Newhard, Kirby Risk; vice-president, Al Brebholz, Brebholz Electric, Indianapolis; secretary, Burt Hannewald of Scherer Electric, Indianapolis.

Suggestions have been pouring into NISA headquarters for a new name for the association. A survey of members has been made to get an idea of the name most members seem to prefer. No official action has been taken, of course, but the association is urging every member to participate in the discussions and to send in his suggestions.

A few members have gone on record opposing a change in name, but more shop operators appear to favor a change to a name more completely descriptive of their activities.



AT HEART OF AMERICA Chapter meeting in Pittsburg, Kan., the first meeting of the group since its founding, from left: James A. Covert of Covert Electric Machinery Co. and William N. Pickett of Electric Motor Supply Co., Joplin, Mo., and Fred B. Wipperman, NISA executive consultant.



ON at Sunset — OFF at Sunrise . . . YEAR IN . . . YEAR OUT WITHOUT ATTENTION

1. **Provide Maximum PERFORMANCE**
2. **CONVENIENCE**
3. **ECONOMY**

Timing from 40 below zero to 150 above. 35 ampere incandescent lamp load rating—All parts nickel-plated for extra long life.

Continual resetting of ON time unnecessary. OFF setting easily changed from 10:30 P.M. to 1:30 A.M. or sunrise, without removing dial . . . no tools required.

Completely mechanical—install wherever convenient.

Lug terminals take up to #6 wire without bending.

Save electricity—lighting will not come ON until needed. Labor saving too.

The Tork Astronomic is available in SP, DP, 3P, SPDT, DPDT, 2 Circuit, and Momentary contact—with or without our special Skip-A-Day feature.

TORK TIME CONTROLS, INC.

**WRITE NOW . . . for
details on complete line.**

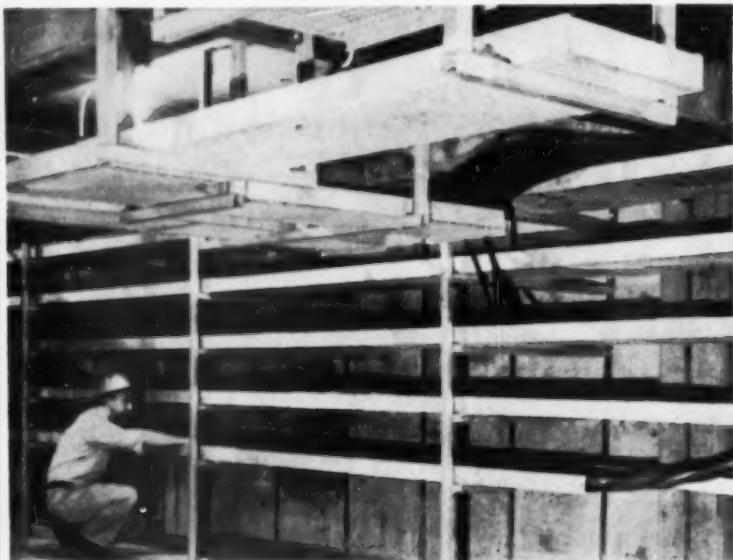
DEPT. Z1, MT. VERNON, N. Y.





SUPPORTS FOR CABLE AND TUBING PASS "THE ACID TEST"—

THE APPROVAL OF DESIGNERS, CUSTOMERS, AND USERS WHO SAY: "Well laid out and engineered." "Nicer and sturdier." "Quick and easy to install." "Boy, does that ladder look good!" "We're ordering more." "For my money, I'll take P-W Supports anytime." "Thanks, for good delivery."



P-W offers the latest in support systems—expanded metal, ladder, or solid—which are interchangeable as required. Comes in 3", 6", 9", 12", 18", and 24" widths, in 1' multiples from 1' to 10', 12' and 16' lengths. Can be purchased in two ways: (1) in certain standard lengths, or (2) in various lengths, which, together with P-W's Extension Connectors, eliminate all field cutting. Adjustable Horizontal and Riser Connectors give the greatest flexibility and meet all changes in direction and elevation. P-W's Channel Connectors, with drive rivets, provide not only a quick connection but good electrical continuity.

Our pre-cut system provides the greatest savings in material and installation time—waste is eliminated and the various parts assembled without field cutting. Send us your drawings and we will take off bill of material. When order is placed, we mark up drawings or reproducibles with catalog numbers. Same numbers are placed on items at time of shipment to facilitate field erection. P-W Twist-Rack is available to support trough or ladder.

Join our evergrowing list of outstanding and satisfied customers. The first step is to write today for our catalogs. Let our engineers help you!

P-W INDUSTRIES, INC.

Representatives throughout country to serve you!

Duncan & Melrose Sts.,
Philadelphia 24, Pa.



DEWEY L. JOHNSON of Atlanta, Ga., this month officially assumed the office of International President of the IAEI. Mr. Johnson, who for many years has been a recognized leader in the formulation and uniform application of standards for the safe installation and use of electricity, will serve for the next 12 months.

EIMA Joins Electrical Alphabet

A new organization, the Electrical Insulating Materials Association, came into being November 1st when 20 representatives of various insulating materials manufacturers met in New York City to form an organization for the purpose of disseminating practical information about the properties and uses of electrical insulating materials.

Sponsored by these manufacturers, the association is completely independent of all other existing technical societies and trade associations. Dissemination of all technical, product and application information will be carried out through the medium of both national and local programs. Requirements for membership are that a company or individual be actively engaged in the development, manufacture or use of basic electrical insulating materials, electrical or electronic equipment. Membership is also extended to engineering and research personnel associated with the electrical industry, universities and government agencies.

Inquiries concerning the new association should be directed to H. H. Chapman, Jr., manager, Apparatus Insulation, Textile Products Div., Owens-Corning, 598 Madison Ave., New York 22, N. Y.

S. M. Cameron Heads Electrical Association of Philadelphia

The Board of Governors of The Electrical Association of Philadelphia at their annual election of officers held last month, elected S. M. Cameron to serve as President in 1958, for his second year in office.

Mr. Cameron is Vice President of the Howard P. Foley Company, one of the largest electrical contracting firms in the United States. He formerly served as Vice President of the Association during 1955 and 1956.

The President of the Philadelphia Electric Company, R. G. Rincliffe, was chosen as Vice President of the Electrical Association for 1958. Mr. Rincliffe had also served as Vice President during the year 1957.

The other officers elected to serve in 1958 were: Treasurer, Philip H. Ward, Jr., Ward Electric Company; Secretary, William E. Rubert of the Union Electric Contracting Company.



INCOMING PRESIDENT of the IAEI's Eastern Section, E. B. Fett of Washington, D. C., is here flanked by executive committeeman George H. Shardien of Elizabeth, N. J. (left), and retiring section president John W. Hager of New York City. Backing him up are (second row, l to r) John D. O'Connell, New York, N. Y., 3rd vice president; John W. King, Providence, R. I., executive committeeman; Frank Stetka, Washington, D. C., representative to the international council, and (rear row, same order) Carlton E. Schaad, New York City executive committeeman; Peter J. Hicks, Jr., Providence, R. I., IAEI Council member; George J. Bostly, Albany, N. Y., and Clifton R. Clark, Windsor, Conn., second-and first vice president respectively.

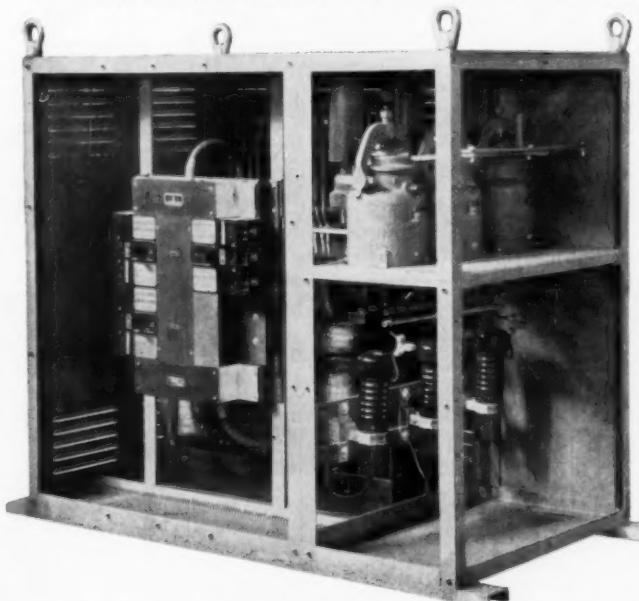
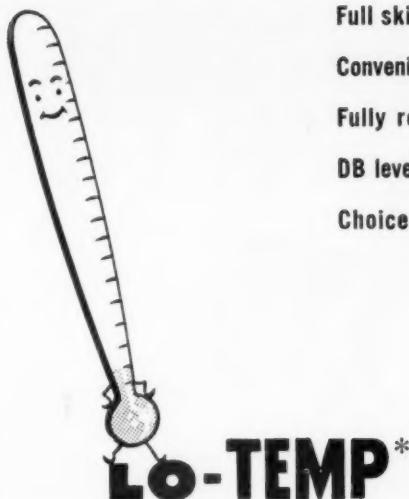
Full skids for easy positioning

Convenient connection locations

Fully removable panels

DB level below NEMA standards

Choice of components



New Standard DISTRIBUTION UNI-CENTERS combine incoming line, transformer and outgoing feeder in one compact unit. The 112.5 KVA, three phase, 4160 to 280y/120 is just 63½" high, 74" long and 36" deep. The high voltage section is equipped with three 3 KV lightning arresters and gang operated, oil fused cutouts. The low voltage section has 3-pole, thermal magnetic case circuit breakers. The unit is shipped, handled and installed in one piece. The Standard DISTRIBUTION UNI-CENTER is available in any KVA rating and to and including 4800 V.

*Standard LO-TEMP transformers provide extra capacity at no extra cost.

Standard Transformer CO.
WARREN, OHIO
"WHEREVER THERE IS POWER"



Phone
2-1563

your customers want 'em

BOTH WAYS



One and Two Hole Pipe and Conduit Straps



Series No. 7000 By the Pound
Series No. 7600 By the Piece



Series No. 8000 By the Pound
Series No. 8600 By the Piece

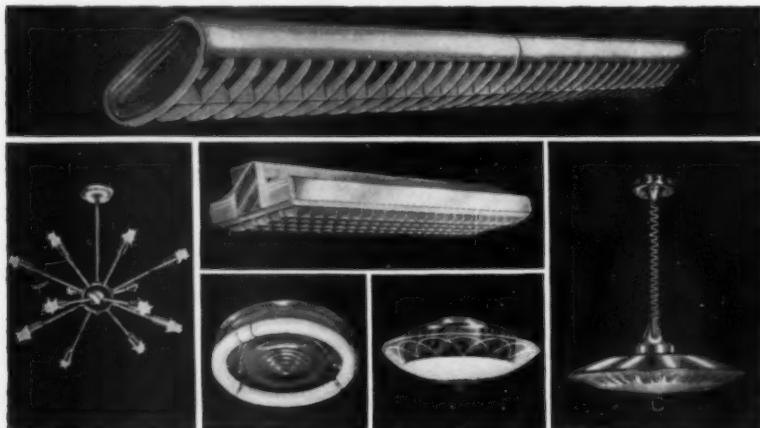
PAINÉ quality pipe and conduit straps are packed by the pound and by the piece — Because your customers want to buy them — BOTH WAYS. BY THE POUND—Packed in 5 and 50 pound cartons. BY THE PIECE—Packed 10 to 1,000 in the carton.

Request Additional Information

the best craftsmen always take



THE PAINÉ COMPANY, 6 Westgate Road, Addison, Illinois



FOR LONGER PROFITS . . .

buy quality lighting fixtures direct from factory

You can make more profit on lighting fixtures with the 'Site Saver' line. Sold direct, the low prices of these fixtures enables you to beat local and mail order competition...and still make a longer profit.

All fixtures absolutely guaranteed to meet with your approval. We certify highest quality and finest workmanship because . . . we make every item in the line . . . from glass bending and decorating to metal fabrication and finishing.

Here's the largest, most complete selection of fluorescent and incandescent fixtures offered by one manufacturer. Buying from one source saves you time and trouble. And you increase profits with 'Site Saver' lighting fixtures.



**WRITE FOR
FREE CATALOG**

Mfr's Reps. needed for
East & West States. Write.

INTERNATIONAL LIGHTING, INC. • 1825 N. 19th St., St. Louis 6, Mo.
DESIGNERS • MANUFACTURERS • MAIN 1-0600

DATES AHEAD

Plant Maintenance & Engineering Show—International Amphitheatre, Chicago, Ill., January 27-30.

Southeastern Electrical Wholesalers Assn.—Annual convention, Biltmore Hotel, Atlanta, Ga., January 29-31.

Upper Midwest Electrical Convention & Trade Exposition — Leamington Hotel and Municipal Auditorium, Minneapolis, Minn., February 2-5.

Power & Communications Contractors Assn. — 13th annual convention, Roosevelt Hotel, New Orleans, La., February 2-5.

American Institute of Electrical Engineers—Winter general meeting, New York, N. Y., February 2-7.

National Rural Electric Cooperative Assn. — Annual meeting, Dallas, Texas, February 2-6.

National Electrical Week—An all-industry event, February 9-15.

National Adequate Wiring Conference —Hotel Statler, Detroit, Mich., February 20-21.

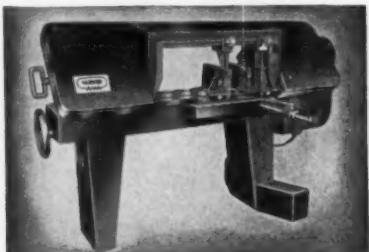
First National Lighting Exposition—Coliseum, New York City, March 9-12.

Electrical Contractors Assn. of Ontario—London Hotel, London, Ontario, Canada, March 20-22.

Electrical Industry Show and Electrical Maintenance Conference—Shrine Exposition Hall, Los Angeles, Calif., March 27-29.

Illuminating Engineering Society—Northeastern Conference, Statler Hotel, Hartford, Conn., April 10-11; East Central Conference, John Marshall Hotel, Richmond, Va., April 14-15; South Central-Southeastern

KALAMAZOO
METAL CUTTING
BAND SAW



MODEL 8C

CUTS 8" ROUND, 16" FLAT STOCK

Cuts pipe and conduit faster, cleaner than other methods.

You'll do better work *easier* with the Kalamazoo Model 8C. And, it's built to give you years of dependable service.

Write for details today.

MACHINE TOOL DIVISION

Kalamazoo | **TANK & SILO CO.**

440 Harrison Street, Kalamazoo, Mich.

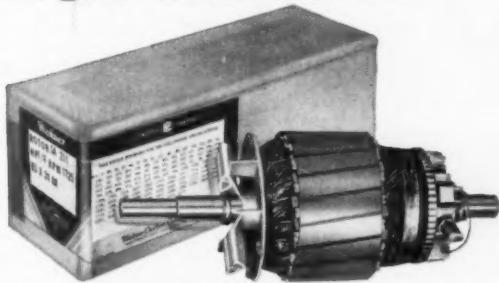
Conference, Lafayette Hotel, Little Rock, Ark., April 24-25; **Southwestern Conference**, Washington Youree Hotel, Shreveport, La., April 28-29; **Midwestern Conference**, Hotel President, Kansas City, Mo., May 1-2; **Inter-Mountain Conference**, Whitman Hotel, Pueblo, Colo., May 8-9; **South Pacific Conference**, El Cortez Hotel, San Diego, Calif., May 12-13; **Pacific Northwest Conference**, Multnomah Hotel, Portland, Ore., May 22-24; and **Great Lakes Conference**, Sheraton Hotel, Rochester, N. Y., June 23-24. **Rocky Mountain Electrical League**—Annual convention, Shirley Savoy Hotel, Denver, Colo., April 13-20. **National Industrial Assn.**—25th "Jubilee Celebration," Hotel Roosevelt, New Orleans, La., May 11-14. **National Fire Protection Assn.**—Annual meeting, Palmer House, Chicago, Ill., May 19-23. **National Association of Electrical Distributors**—50th annual convention, Civic Auditorium, San Francisco, Calif., June 9-13. **Edison Electric Institute**—Annual convention, Convention Hall, Boston, Mass., June 9-12. **New York State Assn. of Electrical Contractors & Dealers, Inc.**—Annual convention, Whiteface Inn, Lake Placid, N. Y., June 29-July 4. **Illuminating Engineering Society**—National Technical Conference, Toronto, Canada, August 17-22. **International Association of Electrical Inspectors**—Western Section, Sheraton-Cadillac Hotel, Detroit, Mich., September 7-10; Northwestern Section, Billings, Mont., Sept. 15-17; Southwestern Section, Southern California, September 22-24; Canadian Section, Montreal, Quebec, Canada October 10-11; Eastern Section, October 13-15; Southern Section, Miami, Fla., October 20-22. **International Association of Electrical Leagues**—Annual Conference, Washington, D. C., October 1-3. **National Electrical Manufacturers Assn.**—Annual conference, Hotel Traymore, Atlantic City, N. J., November 10-14. **National Electronics Conference, Inc.**—Hotel Sherman, Chicago, Ill., October 13-15. **National Electrical Contractors Assn.**—Annual convention and National Electrical Exposition, Adolphus Hotel, Dallas, Texas, November 16-21.



DALTON TUCKER, chief electrical engineer for Richfield Oil building on Wilshire Blvd., Los Angeles, checks meter readings of new 480-volt, 1600-amp power service which was installed as part of extensive modernization program.



1 Stock Wagner Standard Rotors to make more money ... give faster service!



When repairing a small Wagner motor, you'll save time and money by replacing the worn-out rotor with a Wagner Standard Rotor. This way, you keep those winders free for bigger, more profitable jobs. And your customers are pleased with faster service. Cash in on this short cut to profit by stocking Wagner Standard Rotors.

NO PROBLEMS WITH SPECIAL SHAFTS: Just remove the shaft from the Wagner Standard Rotor and replace it with the special shaft.

NO GUESSWORK IN FINDING THE RIGHT ROTOR: Wagner K and M "spec" lists, when used with the "tell-all" label on the rotor package, assure the right choice every time. The "spec" lists are in Catalog MU-40. Write for your personal copy today.

2 Build New Motor Sales with the Wagner Motor Merchandiser!

This 4-tier display stand puts an assortment of motors in full view of your customers... builds profits by helping your customers sell themselves. Sturdy, compact, chrome-plated. Just \$9.95 with your order for any 10 Wagner Motors in one lot. Contact your Wagner branch about this sales-builder today.



WAGNER ELECTRIC CORPORATION
6413 Plymouth Ave., St. Louis 14, Mo., U. S. A.

MOTORS • BEARINGS • STANDARD ROTORS
BRUSHES • CAPACITORS • COMMUTATORS

OVER 850 AUTHORIZED SERVICE STATIONS OR PARTS DISTRIBUTORS



If everything else fails, these phones will still provide trouble-free performance over a distance of many miles. Speaking is activated solely by the sound energy of the voice while ringing is accomplished by a hand-driven magneto. For permanent installation on industrial projects or for temporary use on construction work where they can be moved as the job progresses.

INDOOR AND OUTDOOR MODELS

In selective or common ringing and semi-selective or common talking. Cost of upkeep is negligible.

Write for illustrated catalog



HOSE-McCANN
TELEPHONE CO., INC.
761 THIRD AVENUE
BROOKLYN 32, N.Y.

SAFETY FIRST
and savings, too!



**with INSUL-8-BAR[®]
SYSTEMS**

Mobile Safety Electrification for Cranes,
Monorails, All Moving Machinery.

These are the only enclosed conductor systems that meet all requirements of mobile safety electrification. Standard catalog parts eliminate the need for special engineering. Installation is fast, maintenance easy. Investigate today!

CLIP COUPON
FOR CATALOG

INSUL-8-CORP.

INSUL-8-CORP.
Dept. A, 1369 Industrial Rd., San Carlos, Calif.
Rush catalog re Insul-8-Bar mobile electrification.

NAME _____

COMPANY _____

ADDRESS _____

Among the Manufacturers

Headquarters Announcements

Federal Pacific Electric Co., Newark, N.J., has acquired as a wholly owned subsidiary the Roller-Smith Corp., Bethlehem, Pa.

Fullerton Mfg. Corp., Norwalk, Conn., has been acquired as a division by the Franklin Research Corp., Boston, Mass.

Howard Industries, Inc., Racine, Wis., has purchased the Universal Motor Division of Westinghouse Electric Corp. in Lima, Ohio.

General Electric Co., Schenectady, N.Y.—Milton F. Kent, manager of apparatus product sales, User Industries Sales Dept.

Federal Pacific Electric Co., Newark, N.J.—P.M. Christensen, coordinator of engineering.

Adalet Mfg. Co., Cleveland, Ohio—G.J. Hales, president; Henry D. Stecher, chairman of the board; Johan C.H. Larsen, assistant sales manager.

Rockbestos Products Corp., New Haven, Conn.—Warren S. Jones, assistant to sales manager.

Weston Electrical Instrument Corp., Newark, N.J.—Joseph F. Degen, vice president in charge of manufacturing.

York Corp., York, Pa.—Lloyd D. Wasson, general manager of packaged products.

General Electric Co., Bridgeport, Conn.—Edward K. How, sales manager, standard lines, Conduit Products Dept.

Edison Storage Battery Div., McGraw-Edison Co., West Orange, N.J.—Robert H. Weeks, Jr., assistant division manager.

Anderson Electric Corp., Birmingham, Ala.—R.S. Mills, sales manager, Underground Fittings Div.

Sunbeam Lighting Co., Los Angeles, Calif.—Henry Gluck, vice president in charge of sales.

Square D Co., Detroit, Mich.—Paul A. Christensen, works manager, Industrial Controller Div.

Fasco Industries, Inc., Rochester, N.Y.—E.B. Thompson, vice president, sales, Consumer Products Div.; W.F. Purves, vice president, engineering and research.

General Electric Co., Schenectady, N.Y.—Harry M. Lawson, manager, marketing, Medium Steam Turbine, Generator and Gear Dept.

Best for
Insulation Test!

"MINOR" MEGOHMER

SMALL SIZE
LOW PRICE



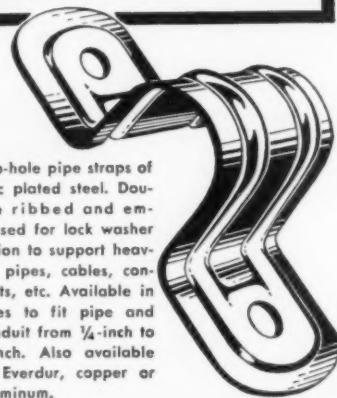
DEEP CASE
EASY CRANKING
with 500 VOLT DC GENERATOR

Range 0-50 Megohms; weight 3 lbs.
True Ohmmeter, independent of generator speed. Complete with genuine leather carrying case, 6 ft. test leads, 50 Megographs.

WRITE FOR BULLETIN NO. 450

HERMAN H. STICHT CO., INC.
27 PARK PLACE, NEW YORK 7, N.Y.

MINERALAC 2-HOLE PIPE STRAPS For Heavier Loads!



Two-hole pipe straps of zinc plated steel. Double ribbed and embossed for lock washer action to support heavier pipes, cables, conduits, etc. Available in sizes to fit pipe and conduit from 1/4-inch to 6-inch. Also available in Everdur, copper or aluminum.

Send for literature and prices
Specify **MINERALAC HANGERS, CLIPS,
STRAPS, BUSHINGS**

MINERALAC ELECTRIC COMPANY
25 N. Peoria St., Chicago 7, Illinois

MINERALAC

Essex Wire Corp., Fort Wayne, Ind.—William G. Skinner, manager of Magnet Wire Plant.

Crouse-Hinds Co., Syracuse, N. Y.—Arthur F. Uhrlandt, director of field sales.

General Electric Co., Bridgeport, Conn.—Arnold Jensen, manager, marketing, Conduit Products Dept.

I-T-E Circuit Breaker Co., Philadelphia, Pa.—Karl K. Kahler, vice president of employee relations.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—P. F. Bauer, E. J. Mercer, and William M. Wallace, vice presidents; A. D. Dennis, secretary.

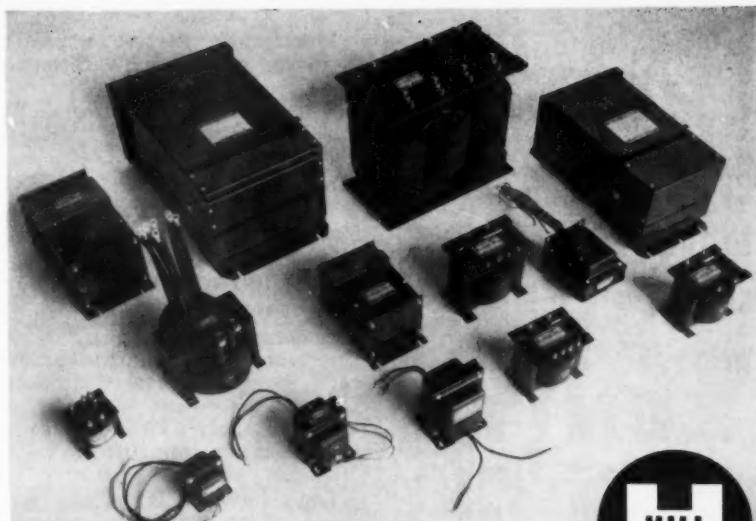
Nelson Electric Mfg. Co., Tulsa, Okla.—Jack L. Gates, agency sales manager.

Regional Appointments

NEW ENGLAND

Wheeler Reflector Co.: Donald B. Rosequist, representative in Boston and North Shore areas, Mass.; William E. Hurry, representative in Maine, New Hampshire and Vermont; Paul T. Smith, representative for Southeastern Massachusetts and Rhode Island.

Sola Electric Co.: Richard Hesse, sales engineer in charge of new office in New Haven, Conn.



Industrial Transformers For Every Application

Hill Transformer Co., Inc. is a quick, reliable source of industrial transformers of highest quality—Wide variety of design; long or short production runs; designed to meet your special requirements.

Power and distribution transformers—Oil Filled, Askarel, Dry Types—available through 5000 KVA. All manufactured to NEMA and ASA standards.

Hill Transformer Co., Inc.

1030 Washington Street
San Carlos • California

HELWIG RED TOP Brushes

- For Better Commutation
- Longer Brush Life



HELWIG CARBON BRUSHES

Helwig RED TOP Brushes with Neoprene Pad absorb shock and vibration to give you better contact, eliminate chipping and offer longer brush life.

Protect your electrical equipment with Helwig RED TOP carbon brushes . . . for both slip ring and commutator applications.

HELWIG CO. CARBON PRODUCTS

2546 N. 30th St.
MILWAUKEE 10, WIS.



NOW

for every home,
business
and industrial
need!

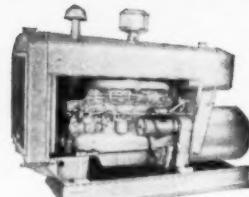
the industry's newest models....
at today's most inviting prices!

UNIVERSAL ELECTRIC POWER AND LIGHT PLANTS

New, low-cost
lightweight, air-cooled 3500 watt
model.



New popular
diesel model has
25,000 watt capacity.



New models . . . both gasoline and diesel series . . . fastest deliveries . . . sure to please prices—that sums up Universal Electric Power and Light Plants—the fastest growing line today!

Whatever you want in the broad 250 watt

to 35 kw range, Universal has it. Models for emergency, intermittent or constant service—anywhere. Air-cooled types, water-cooled multi-cylinder models. All controls. All offering definite weight- and space-saving advantages. Get all the facts!

UNIVERSAL MOTOR CO.
438 Universal Drive, Oshkosh, Wis.

Send me complete illustrated electric power and light plant literature and prices.

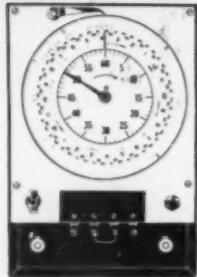
Name _____
Firm _____
Address _____
City _____ State _____

Universal
of Oshkosh

ELECTRIC POWER AND LIGHT PLANTS
MARINE ENGINES

Need Efficient Timing?

You can
get it
to the
second
with...



ZENITH program timers

Signal bells, buzzers, lights, etc. are dependably controlled with ZENITH units—proved in countless applications. Synchronous motor for accuracy...5-minute intervals in any 24-hour schedule...easily changed...calendar cutout optional. Write for bulletin. See Classified Phone Directory for Name of Local Distributor.

ZENITH ELECTRIC CO.

155 WEST WALTON STREET • CHICAGO 10, ILLINOIS



BE PRECISE--
SPECIFY
PRECISION

SUBSTATION TRANSFORMERS

DRY TYPE or LIQUID IMMERSED

CUSTOM-BUILT



PRECISION—specializes in manufacturing transformers exclusively! Testing and acceptance of FTC dry type and liquid immersed substation transformers by some of industry's most critical engineers enables us to provide you with the industry's only 5-year guarantee...and

- Lowest noise level in the industry
- High overload capacity
- Structural steel construction
- Several-cycle vacuum impregnated windings
- Most complete range of sizes

Please send for Technical Bulletins & Catalog

Prc **PRECISION**
TRANSFORMER CORP.
2218 W. Lake St., Chicago 12, Ill.

Sales & Engineering Offices in All Principal Cities

MIDDLE ATLANTIC

Murray Mfg. Corp.: Thomas D. McCrink, representative in Northern New Jersey.

Allis-Chalmers Mfg. Co.: C. W. Parker, Jr., manager of Philadelphia district.

SOUTH ATLANTIC

Allis-Chalmers Mfg. Co.: J. M. Mathews, manager of Richmond (Va.) district; Gordon Hood, manager of Charleston (S. C.) district.

EAST CENTRAL

Anderson Electric Corp.: W. J. Dres, sales representative in Chicago covering Northern Illinois, Eastern Wisconsin, and Upper Michigan; John V. Scott, sales representative for Indiana and Michigan.

Gould-National Batteries, Inc.: C. W. Hanna, Chicago regional manager of the Industrial Division.

Adalet Mfg. Co.: Edward P. Rawson, representative in Greater Cleveland area.

Spang-Howarduct Div., National Supply Co.: Midwestern Electrical Representatives, Chicago, sales agent in Northern Illinois and Northwest Indiana.

WEST CENTRAL

Accurate Mfg. Co.: Robert L. Haizlip Co., Kansas City, agents covering Kansas, Nebraska, Western Missouri and Western Iowa.

Pass & Seymour, Inc.: Ted G. Huttlemaier, representative in North Texas-Oklahoma territory, office in Dallas; Rudolph E. Neal, representative in South Texas area, office in Houston.

Allis-Chalmers Mfg. Co.: Electric Supply of Oklahoma, Inc., and Southwest Electric Co., agents in Oklahoma City, Oklahoma; Sikeston Motor and Transformer Co., Inc., Sikeston, Mo., agency for Southeastern Missouri, Southern Illinois, Northwestern Tennessee, and Southwestern Kentucky; R. E. Burmeister Electric Co., Minneapolis, agency in Minnesota, North Dakota, South Dakota and Wisconsin.

WEST

Spang-Howarduct Div., National Supply Co.: Murphy-Hain Co., Los Angeles, sales agents in Southern California, Arizona, and Southeastern Nevada; Dane O. Egbert, district manager in San Francisco.

Sola Electric Co.: G. L. Bennis, manager of new branch office in San Francisco.

Wagner Electric Corp.: L. E. Long, manager of San Francisco electrical sales branch.

SAVE in 1958 on the cost of your **CONCRETE DRILLING**



It costs less in electric hammer up-keep to do all your concrete drilling with Wodack Star Drills and the Wodack "Do-All"® Electric Hammer

- Because Wodack Star Drills are forged from special steel, hold their edges longer and can be redressed many times back to their original diameter.
- Because the Wodack "Do-All" Electric Hammer is a top-grade tool, with wearing parts easily replaceable.
- Because the "Do-All" Hammer serves two ways: as a hammer and (with hammer member removed) as a heavy duty $\frac{3}{8}$ " electric drill. Two tools for the price of one.
- Because fast factory service is available for tool repairs and the redressing of star drills.

For 30 years Wodack Electric Hammers have been used by contractors and in maintenance work. Buy the best and save on up-keep. Ask for Bulletin 510-EC

Wodack Electric Tool Corp.

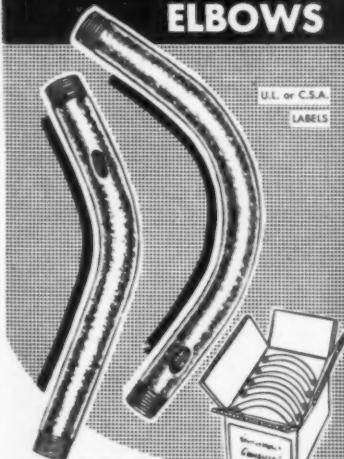
4627 W. Huron St., Chicago 44, Ill., U.S.A.

Phone: AUSTIN 7-9866

Our 42nd Year Making Wodack® Tools

Standard Radius

RIGID Conduit ELBOWS



$\frac{1}{2}$ " to 6" sizes • 45° and 90°

BLACK ENAMELED —

HOT DIP GALVANIZED

Also available in wrought iron or aluminum

CONDUIT NIPPLE MFG. CO.

1455 SPRING GARDEN AVE. PITTSBURGH 12, PA.

Just Out!

ELECTRICAL CONSTRUCTION COST MANUAL

Helps you save time and trouble in estimating electrical construction costs and to develop more realistic, profitable bids. Develops standard assemblies as a nucleus for unit costing of materials and labor, covers job factors, overhead, and profit; shows how to bring these factors together in an integrated cost system and estimate. By Ralph E. Johnson, Pres., Sturgeon Elec. Co. 427 pp., 226 illus., \$10.00

WIRING MANUAL FOR HOME AND FARM

A practical manual to help you plan wiring systems that will effectively meet today's growing electrical needs in home and farm. Methods for determining loads, service entrance feeder size, number and size of branch circuits, number and type of outlets, quick reference tables—these and other practical helps are all part of this handy manual. By A. Carl Bredahl. 221 pp., 135 illus., tables, \$4.95

ENGINEERING MATERIALS HANDBOOK

Gives answers to both routine and specialized questions regarding the choice of engineering materials. Considers materials from the viewpoint of engineering structures, machinery, and equipment, and includes technical tables, design information, structural characteristics, etc. Edited by Charles L. Mantell, Consulting Eng.; Newark College of Engrs. 1906 pp., 648 illus., \$21.50

EPOXY RESINS



Covers the whole range of information needed to make effective industrial use of epoxy resins. Applications, covered against a background of chemistry and technology of the resins and their reactions in curing, include encapsulation of electric motors, cable sealants, transformer leak sealants, and glues for patching transformer bushings. By Henry Lee and Kris Neville, The Epoxylite Corp. 305 pp., 176 illus., \$8.00

10 DAYS⁺ FREE EXAMINATION

McGraw-Hill Book Co., Dept. EC-1
327 W. 41st St., N.Y.C. 36

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep plus few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon—same return privilege.)

Johnson—Elect. Const. Cost Manual, \$10.00
 Bredahl—Wiring Manual for Home & Farm, \$4.95
 Mantell—Engineering Mat'l's Hdbk., \$31.00
 Lee & Neville—Epoxy Resins, \$8.00

(PRINT)
Name

Address

City Zone State.....

Company

Position

For price and terms outside U. S.,
write McGraw-Hill Int'l., N.Y.C.

EC-1

WHERE TO BUY

Equipment, Materials,
Supplies and Services for
Electrical Construction—
Maintenance—Repairs

IDENTIFICATION NAME PLATES

For controls and panels—precision engraved on blackened or black anodized alum.—any title—quick service by mail on large or small jobs—send for sample and prices.

ATLANTIC ENGRAVERS, INC.
52 Ocean Ave. Amityville, N. Y.

• Rotometers • Plan Measures
• Tally Counters • Voltmeters • Megohmmeters

R. A. KOENEMAN COMPANY

1400 Delmar Blvd. International Trade Mart
St. Louis, Mo. New Orleans, La.

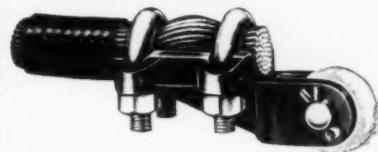
MAIL ORDERS PROMPTLY FILLED

TO manufacturers of equipment and those offering special services, this section offers an inexpensive means of keeping products or services regularly before your potential customers—the readers of ELECTRICAL CONSTRUCTION & MAINTENANCE. Write and send available here provide opportunity for you to be represented in every issue at low cost. Can we serve you?

ELECTRICAL CONSTRUCTION
& MAINTENANCE

"EFFICIENCY" Cable Strain Clamp

WITHOUT DAMAGE TO CABLE



... WITHSTANDS
DIRECT PULL OF 17,000 POUNDS

Efficiency Cable Strain Clamps lock cable safely and securely without possible strain or damage. "H" construction of clamps and high ridge across center of cable prevents cable from slipping. Takes cable from 1/0 to 1,500,000 c.m. Three clamp sizes cover all cable sizes. Furnished with eye or clevis, for AC or DC service.

EFFICIENCY
ELECTRIC & MFG. CO.
EAST PALESTINE, OHIO

NEW SUBSCRIPTION ORDERFORM

ELECTRICAL CONSTRUCTION & MAINTENANCE
330 West 42nd Street, New York 36, N. Y.

Please enter my personal subscription to start as soon as possible:

\$3.00 enclosed for one year * Send invoice

Please Print
Name

Title or Position
Address
(Home Company)

City Zone

State

Company Name

Nature of Company's Business

I am in charge of elec. work—Yes No Operate a motor repair shop—Yes No

*Above rates good only in U.S. Please write for rates in other countries.

CONDUIT BENDING SELF TAUGHT

BY EVERETT GATES

103 pages, 8½ x 11, 15 tables, 106 illustrations, \$2.00.

If you use a hydraulic bender we believe you will be glad you ordered this book. Send coupon today without obligation.

Electrical Publications Co.
P. O. Box 3029
Columbia 3, S. C.

() Send me the new book CONDUIT BENDING SELF-TAUGHT for 10 days examination on approval. In 10 days I will return the book or send \$2.00.

Name

Address

City Zone State.....

() I enclose \$2.00 with the understanding that if I am not satisfied I may return the book in ten days and my \$2.00 will be returned.

Advertising In This Issue

● Accurate Mfg. Co.	6
● Advance Transformer Co.	43
Allen-Bradley Co.	169, 170
Allis-Chalmers Mfg. Co.	132, 185
● All-Steel Equipment, Inc.	41
● American Brass Co., The American Metal Hose Branch	119
American Telephone & Telegraph Co.	141
AMP Incorporated	56, 57
Amprobe a Div. of Pyramid Inst. Corp.	42
Anaconda Wire & Cable Co.	146, 147
Appleton Electric Co.	2
● Arro Expansion Bolt Co.	120
● Arrolet Corp.	174
Atlantic Engravers, Inc.	201

Bell Telephone System	14
Benjamin Electric Mfg. Co.	123
Biddle Co., James G.	177
Black & Decker Mfg. Co.	175, 191
Blackhawk Industries	188
● Blackhawk Mfg. Co.	55
● Boston Woven Hose & Rubber Co.	201
● Briegel Method Tool Co.	54
Brook Motor Corp.	188
Buffalo Forge Co.	190
BullDog Electric Products Co.	121
Burndy Corp.	117
Bussmann Mfg. Co.	30

Century Electric Co.	131
Champion Lamp Works.	122
Chase & Sons Inc.	17
● Circle F Mfg. Co.	167
Clark Controller Co., The	40
Columbia Cable & Electric Corp.	79
Conduit Nipple Mfg. Co.	200
Couch Co., Inc., S. H.	158
● Crescent Insulated Wire & Cable Co.	11
● Crouse-Hinds Co.	Second Cover
● Curtiss Lig. Inc.	30
Cutler-Hammer, Inc.	21

Delta Star Electric Div., H. K. Porter Company, Inc.	182
Diamond Wire & Cable Co.	76
• Dossett Mfg. Corp.	77

Economy Fuse & Mfg. Co.	80
Efficiency Electric & Mfg. Co.	201
Electrical Construction & Maintenance	201
Electrical Publications Co.	201
Electric Tube Products.	61
Electri-Flex Co.	161
Emerson-Pvne Co.	18

Fasco Industries, Inc.	129
• Fullman Mfg. Co.	160
Furnas Electric Co.	141

● Garden City Plating & Mfg. Co.	70
● Gedney Electric Co.	71
● General Electric Co.	
● Apparatus Sales Div. Fourth Cover	
Lamp Div.	74
Globe Co., The	180
Goodrich Chemical Co., B. F.	84
● Graybar Electric Co., Inc.	84
● Greenlee Tool Co.	180
● Guth Co., Edwin F., The	47

• Helwig Co.	199
• Henderson-Hazel Corp.	150
Hill Transformer Co., Inc.	199
• Hose-McCann Telephone Co., Inc. . . .	198
Hubbell Inc., Harvey	5

Ideal Industries, Inc.	44
Ideal-Simplet Fittings, Inc.	173
Ilco Corp.	37
Insul-8 Corp.	198
International Lighting Co.	190
I-T-E Circuit Breaker Co.	
Small Air Circuit Breaker Div.	160
Switchgear Div.	49, 50, 51,
Jenkins Brothers	73
Kalamazoo Tank & Silo Co.	190
Kato Engineering Co.	174
Koeneman Co., R. A.	201

Lantz Mfg. Co., Inc.	2
● Leviton Mfg. Co.	12
● Lidseen of No. Carolina, Inc.	15
Lightolier	5

Mason Co., L. E.	1
McGill Mfg. Co., Inc.	7
McGraw-Hill Book Co.	20
McPhilbin Ltg. Co.	16
Metalcraft Products Co., Inc.	18

Micro Switch a Div. of Minneapolis-Honeywell Regulator Co.	2
● Midwest Electric Mfg. Co.	13
● Mineraliac Electric Co.	19
● Mitchell Ltg. Co.	17

National Electric Products.....	15
• National Price Service.....	15
National Wiring Bureau.....	162

- Okonite Co., The.....126, 127
- Onan & Sons, Inc., D. W.....17

● Paine Co., The.....	19
Paranite Wire & Cable Div., Essex Wire Corp.....	6
Pass & Seymour, Inc.....	6
● Phelps Dodge Copper Products Corp.....	7
Phillips Drill Co.....	12
Pittsburgh Standard Conduit Co.....	4
● PLM Products, Inc.....	19
Plymouth Rubber Co., Inc.....	33, 34,
Polyken Sales Division of The Kendall Co.....	5
● Porcelain Products, Inc.....	14
● Precision Transformer Corp.....	174, 20
● P-W Industries, Inc.....	19
Pyle-National Co., The.....	6

Quaker Rubber Div., H. K. Porter
Company, Inc. 181

- Ramset Fastening Inc. 164
- Rawlplug Co., Inc., The 130
- Remington Arms Co., Inc. 61
- Republic Steel Corp. 12, 13
- Revere Electric Mfg. Co. 155, 186
- Ridge Tool Co., The 149
- RLM Standards Institute, Inc. 29
- Rohm & Haas Co. 38, 39
- Rome Cable Corp. 62
- Royal Electric Corp. 191

S & C Electric Co.	67
Sangamo Electric Co.	142
Showmanship Inc.	32
Simplex Wire & Cable Co.	82
Slater Electric & Mfg. Co., Inc.	118
Sola Electric Co.	151
Square D Co.	Third Cover, 1,
Standard Transformer Co., The	195
Steel & Tubes Div.	12,
Sticht Co., Inc., Herman H.	198
Superior Electric Co., The	161
Sylvania Electric Products, Inc.	48

• Thomas & Betts Co., The	66
Thompson Electric Co., The	159
Tork Time Controls, Inc.	193
• Triangle Conduit & Cable Co., Inc.	138, 139

Universal Motor Co.	199
Up-Right Scaffold Co.	40
Utica Drop Forge & Tool Div., Kelsey-Hayes Co.	22

- Wagner Electric Corp.....178, 197
- Western Insulated Wire Co.....144, 145
- Westinghouse Electric Corp.
- Pittsburgh24, 25, 26, 27, 64, 65
- Wheeler Reflector Co.....183
- Wheel Trueing Tool Co.....154
- Where To Buy.....201
- Wiley Inc., R & W.....128
- Winpower Mfg. Co.....192
- Wodack Electric Tool Corp.....200
- Youngstown Sheet & Tube Co., The.. 177
- Zenith Electric Co.....200

• These manufacturers
advertised their products in
the ELECTRICAL PRODUCTS GUIDE

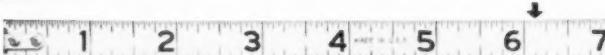


For more complete information, and application data on their lines, refer to the index of Advertisers in the ELECTRICAL PRODUCTS GUIDE . . . the 13th issue of ELECTRICAL CONSTRUCTION AND MAINTENANCE.

50%
MORE TERMINALS
IN THE
SAME SPACE!

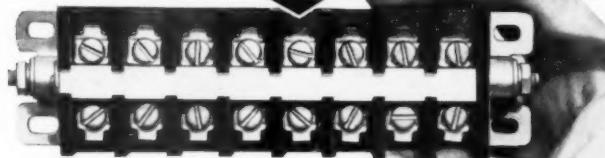
SQUARE D's NEW TERMINAL BLOCKS

MORE FLEXIBILITY, TOO!



NEW 12 TERMINALS
CHANNEL-MOUNTED

OLD 8 TERMINALS
ROD-MOUNTED



NOTICE (above) how little space is required to remove or add a Square D channel-mounted terminal block to the completely assembled unit. Especially important for a quick change when an additional terminal must be inserted into grouping.

LOOK (at right)...

all sizes can be mounted on same channel...25 ampere pressure wire connectors, 25 to 50 ampere box lugs...all can be interlocked together. Terminals in kit form to "do-it-yourself" or factory-assembled to standard specifications.



SEE (below)...there is only one perforated channel required for either weld or screw-on mounting...available in standard lengths that can be cut "on the job" to fit any length requirement. Eliminates stocking various sizes.



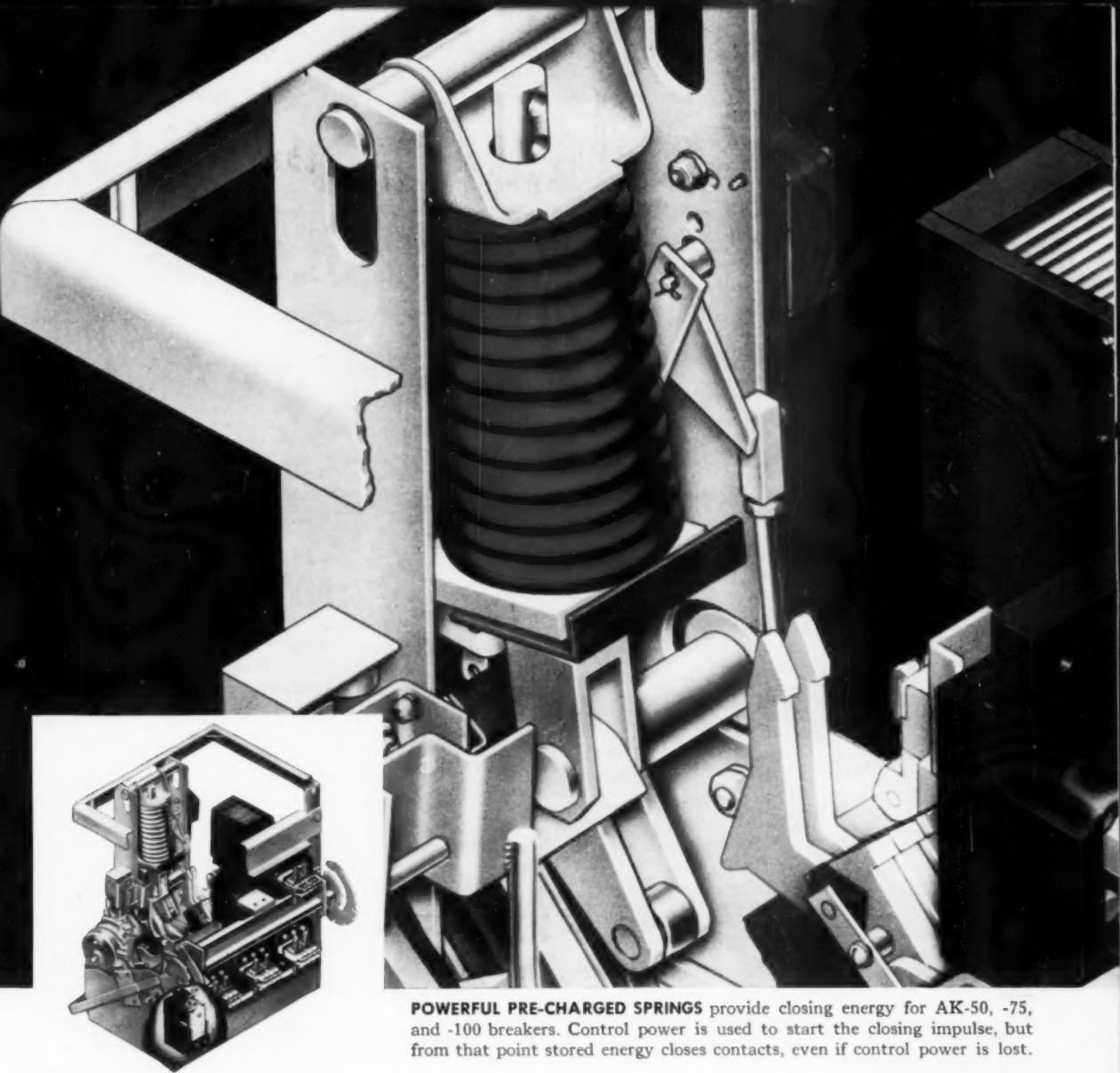
ASK YOUR SQUARE D FIELD ENGINEER

or write for Bulletin which covers details on Channel-Mounted Terminal Blocks. Address Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE



SQUARE D COMPANY



POWERFUL PRE-CHARGED SPRINGS provide closing energy for AK-50, -75, and -100 breakers. Control power is used to start the closing impulse, but from that point stored energy closes contacts, even if control power is lost.

A General Electric Feature Since 1952

**STORED ENERGY MECHANISM MEANS POSITIVE
CLOSING FOR AK-50, -75, AND -100 BREAKERS**

Positive closing action, made possible by energy stored in a spring, gives G-E air circuit breakers the ability to close and latch against short circuits equal to the breaker's interrupting rating at 600 volts a-c — minimizes contact damage, reduces mechanical

stresses, and lowers control power needs. The spring-operated stored energy closing mechanism has been proved by field applications for over five years. *Watch for coming announcements extending use of this principle.* General Electric, Schenectady 5, N.Y.

527-1

Progress Is Our Most Important Product

GENERAL  **ELECTRIC**